

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

	Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556 1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	N/A	NA	NA
76131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	N/A	NA	NA
79005 1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	N/A	NA	NA
75343 1,1-Dichloroethane	NA	NA	NA	5.06E+06	N/A	NA	NA
75354 1,1-Dichloroethylene	NA	NA	NA	2.25E+08	N/A	NA	6.9E-05
120821 1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	N/A	NA	NA
95501 1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	N/A	NA	NA
541731 Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	N/A	NA	NA
106467 1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	N/A	NA	2.5E-06
78933 Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	N/A	NA	NA
67641 Acetone	NA	NA	NA	1.00E+09	N/A	NA	NA
71432 Benzene	NA	NA	NA	1.75E+06	N/A	8.7E-10	4.3E-05
74839 Bromomethane	NA	NA	NA	1.52E+07	N/A	NA	NA
75150 Carbon Disulfide	NA	NA	NA	2.67E+06	N/A	NA	NA
108907 Chlorobenzene	NA	NA	NA	4.72E+05	N/A	NA	NA
75003 Ethyl Chloride	NA	NA	NA	5.32E+06	N/A	NA	NA
67663 Chloroform	NA	NA	NA	7.92E+06	N/A	NA	NA
156592 cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	N/A	NA	3.8E-04
110827 Cyclohexane	NA	NA	NA	5.50E+04	N/A	NA	NA
100414 Ethylbenzene	NA	NA	NA	1.69E+05	N/A	NA	NA
98828 Isopropylbenzene	NA	NA	NA	5.60E+04	N/A	NA	NA
108872 Methyl cyclohexane	NA	NA	NA	1.40E+04	N/A	NA	NA
1634044 Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	N/A	NA	NA
75092 Methylene chloride	NA	NA	NA	1.30E+07	N/A	NA	NA
127184 Tetrachloroethylene	NA	NA	NA	2.00E+05	N/A	7.7E-09	NA
108883 Toluene	NA	NA	NA	5.26E+05	N/A	NA	NA
156605 trans-1,2-Dichloroethylene	NA	NA	NA	8.30E+08	N/A	NA	NA
79016 Trichloroethylene	NA	NA	NA	1.10E+06	N/A	5.4E-06	1.4E-02
75014 Vinyl chloride	NA	NA	NA	2.76E+06	N/A	1.6E-08	2.1E-04
1330207 Xylenes	NA	NA	NA	2.20E+05	N/A	NA	NA
98862 Acetophenone	NA	NA	NA	6.13E+06	N/A	NA	NA
91203 Naphthalene	NA	NA	NA	3.10E+04	N/A	NA	6.5E-04
91576 Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	N/A	NA	NA
92524 Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	N/A	NA	NA
208968 Acenaphthylene	NA	NA	NA	3.93E+03	N/A	NA	NA
83329 Acenaphthene	NA	NA	NA	4.24E+03	N/A	NA	NA
86737 Fluorene	NA	NA	NA	1.90E+03	N/A	NA	NA
85018 Phenanthrene	NA	NA	NA	1.28E+03	N/A	NA	3.6E-04
120127 Anthracene	NA	NA	NA	4.34E+01	N/A	NA	NA
C9-C18 C9-C18 Aliphatics	NA	NA	NA	1.00E+04	N/A	NA	NA
C11-C22 C11-C22 Aromatics	NA	NA	NA	5.80E+06	N/A	NA	NA
C5-C8 C5-C8 Aliphatics	NA	NA	NA	1.10E+07	N/A	NA	NA
C9-C10 C9-C10 Aromatics	NA	NA	NA	5.10E+07	N/A	NA	NA
C9-C12 C9-C12 Aliphatics	NA	NA	NA	7.00E+04	N/A	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-06	2E-02

☐ = Cancer risk > 1E-05
or HQ/HI > 1E+00

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES ☐ OR ☐

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES ☒ X

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Chemical CAS No. (numbers only; no dashes)	Enter initial conc. Chemical	95% UCL groundwater conc., C_w (ppb)	Depth below grade to bottom of exposed space floor, L_f (ft or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil groundwater temperature, T_g (°C)	Vadose zone soil type (used to estimate soil vapor permeability)	OR	Use-defined vadose zone soil vapor permeability, k_v (cm ²)	ENTER Vadose zone soil dry bulk density, ρ_b (g/cm ³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water filled porosity, θ_w (cm ³ /cm ³)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time, ET (hrs/day)	ENTER Conversion factor, CF (hr/day)
71556	1,1,1-Trichloroethane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
79008	1,1,2-Trichloroethane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76343	1,1-Dichloroethane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76354	1,1-Dichloroethene	1.17E-01	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
69501	1,2-Dichloroethane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
641731	1,2-Dichloroethene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
106467	Dichlorobenzene, 1,2		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76633	1,4-Dichlorobenzene	4.30E-01	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
81641	Benzene, 2 (MEX)		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
71432	Acetone		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
74836	Benzene	7.66E-02	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76150	Bromobenzene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
108807	Carbon Dioxide		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
78003	Chlorobenzene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
67663	Ethyl Chloride		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
168562	Chloroform		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
110827	cis-1,2-Dichloroethene	5.02E-00	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
100414	Cyclohexane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
96528	Ethylbenzene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
108972	Isopropylbenzene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
103444	Methyl cyclohexane		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76082	Methyl Tertiarybutyl Ether		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
127184	Methylene chloride	4.16E-01	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
105883	Toluene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
156876	trans-1,2-Dichloroethene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75016	Trichloroethylene	2.15E-01	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
1300207	Vinyl chloride	1.97E-01	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
30462	Xylene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
30462	Acetophenone		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
91203	Naphthalene	1.35E-00	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
91578	Methylnaphthalene, 2		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
92524	Biphenyl, 1,1'		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
208869	Acetanilide		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
83326	Acetanilide		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
86737	Fluorene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
55018	Phenanthrene	2.10E-00	52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
120129	Anthracene		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
CP-C16	CP-C16 Aromatic		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C11-C22	C11-C22 Aromatic		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
CS-C6	CS-C6 Aliphatic		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
CP-C16	CP-C16 Aromatic		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
CP-C12	CP-C12 Aliphatic		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 18, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical		Diffusivity in air, D _a (cm ² /s)	Diffusivity in water, D _w (cm ² /s)	Henry's law constant at reference temperature, H (atm·m ³ /mol)	Henry's law constant reference temperature, T _R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH _{v,b} (cal/mol)	Normal boiling point, T _B (°K)	Critical temperature, T _C (°K)	Organic carbon partition coefficient, K _{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
CAS No.	Chemical											
71558	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
78131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	6.81E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.80E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.86E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.87E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.28E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	269.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Etlinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Coverable Unit 2
Aberjona Auto Parts

	Source- building separation, L_s (cm)	Vadose zone soil air-filled porosity, θ_a^v (cm ³ /cm ³)	Vadose zone effective total fluid saturation, S_{we} (cm ³ /cm ³)	Vadose zone soil intrinsic permeability, k_i (cm ²)	Vadose zone soil relative air permeability, k_{ra} (cm ²)	Vadose zone soil effective vapor permeability, k_v (cm ²)	Thickness of capillary zone, L_c (cm)	Total porosity in capillary zone, θ_{ac} (cm ³ /cm ³)	Air-filled porosity in capillary zone, θ_{ac} (cm ³ /cm ³)	Water-filled porosity in capillary zone, θ_{wc} (cm ³ /cm ³)	Floor- wall seam parameter, X_{sw} (cm)	Bldg ventilation rate, Q_{ave} (m ³ /s)	Area of enclosed space below grade, A_b (cm ²)	Crack- to-total area ratio, n (unitless)	Crack depth below grade, Z_m (cm)	Enthalpy of vaporization at avg. groundwater temperature, ΔH_v (cal/mol)	Henry's law constant at avg. groundwater temperature, H_{10} (atm-m ³ /mol)	Henry's law constant at vg. groundwater temperature, H_{10} (unitless)	
71556	1,1,1-Trichloroethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.885	8.60E-03	3.96E-01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.438	4.55E-01	1.96E+01
79905	1,1,2-Trichloroethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	9.572	3.88E-04	1.67E-02
75343	1,1-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.450	2.88E-03	1.24E-01
75354	1,1-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	6.382	1.47E-02	6.34E-01
120621	1,2,4-Trichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	13.230	4.35E-04	1.67E-02
95591	1,2-Dichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.521	1.41E-06	8.09E-05
541731	Dichlorobenzene, 1,3-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.503	4.11E-03	1.77E-01
106487	1,4-Dichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	11.243	8.85E-04	3.63E-02
78533	Butene, 2- (MERO)	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.486	4.90E-05	2.11E-03
67141	Acetone	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.559	1.97E-05	8.50E-04
71432	Benzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8.122	2.69E-03	1.16E-01
74838	Bromomethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.337	5.52E-03	2.38E-01
73150	Carbon Disulfide	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8.682	8.99E-03	3.01E-01
108907	Chlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8.503	1.54E-03	6.65E-02
79903	Ethyl Chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.201	7.79E-03	3.35E-01
67663	Chloroform	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.554	1.86E-03	8.02E-02
156592	cis-1,2-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.734	2.04E-03	8.77E-02
110827	Cyclohexane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	10.888	1.75E+00	7.54E+01
100414	Ethylbenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.540	3.18E-03	1.37E-01
90628	Isopropylbenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.540	3.18E-03	1.37E-01
108872	Methyl cyclohexane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.540	3.18E-03	1.37E-01
153404	Methyl Tertiary Butyl Ether	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.505	3.70E-01	1.59E+01
76592	Methylene chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.447	5.16E-04	2.22E-02
127184	Tetrachloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.034	1.17E-03	5.03E-02
106883	Toluene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	9.583	3.73E-01	1.61E+01
156905	trans-1,2-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8.154	2.92E-03	2.86E-01
79016	Trichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.417	6.27E-03	3.56E-01
75014	Vinyl chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8.557	4.79E-03	2.06E-01
1330207	Xylenes	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	5.000	1.73E-02	7.46E-01
68652	Acetophenone	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.542	5.88E-06	2.62E-04
51203	Naphthalene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7.518	8.91E-06	3.83E-04
51576	Methylnaphthalene, 2-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	12.913	6.55E-03	2.53E-03
52524	Biphenyl, 1,1'-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.507	8.86E-04	3.15E-02
205960	Acenaphthylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.472	2.16E-04	1.14E-02
83329	Acenaphthene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.531	2.45E-04	1.05E-02
86737	Fluorene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16.133	3.67E-05	1.59E-03
85018	Phenanthrene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16.235	2.20E-06	9.48E-07
120127	Anthracene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1.479	1.14E-04	4.90E-03
C9-C18	C9-C18 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16.393	1.26E-05	5.43E-04
C11-C22	C11-C22 Aromatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	6.25E-01	3.58E-01
C5-C8	C5-C8 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	3.64E-04	1.65E-02
C9-C10	C9-C10 Aromatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	6.49E-01	2.79E-01
C9-C12	C9-C12 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	3.96E-03	1.70E-01
		30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	7.90E-01	3.36E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - DT
Southwest Properties, Wells G&H Superfund Site, Over-
Aberjona Auto Parts

	Vapor viscosity at ave. soil temperature, μ Pa (g/cm-s)	Vadose zone effective diffusion coefficient, D_{eff}^v (cm ² /s)	Capillary zone effective diffusion coefficient, D_{eff}^c (cm ² /s)	Total overall effective diffusion coefficient, D_{eff}^T (cm ² /s)	Diffusion path length, L_d (cm)	Convection path length, L_c (cm)	Source vapor conc., C_{soil} (ug/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D_{eff}^{crack} (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent foundation pore number, n_{eq} (Pa)	Infinite source attenuation coefficient, α (unitless)	Infinite source bldg. conc., C_{bldg} (ug/m ³)	Unit risk factor, URF (ug/m ³) ⁻¹	Reference conc., R/C (mg/m ³)
71555 1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.59E-04	4.59E-04	30.48	52.12	N/A	0.10	5.22E+00	4.75E-04	4.00E+02	1.44E+179	1.72E-04	N/A	N/A	2.2E+00
76131 Trichloro-1,2,2-trifluoroethane, 1,1,2	1.75E-04	1.75E-04	1.63E-04	1.63E-04	30.48	52.12	N/A	0.10	5.22E+00	1.75E-04	4.00E+02	#NUM!	1.35E-04	N/A	N/A	3.0E+01
79005 1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.05E-04	30.48	52.12	N/A	0.10	5.22E+00	5.24E-04	4.00E+02	1.85E+162	1.75E-04	N/A	N/A	1.6E-05
75343 1,1-Dichloroethane	1.75E-04	4.69E-04	4.29E-04	4.40E-04	30.48	52.12	N/A	0.10	5.22E+00	4.59E-04	4.00E+02	6.34E+185	1.71E-04	N/A	N/A	5.0E-01
75354 1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.25E-04	30.48	52.12	7.42E+01	0.10	5.22E+00	5.47E-04	4.00E+02	3.87E+155	1.76E-04	1.31E-02	N/A	2.0E-01
120821 1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.18E-04	30.48	52.12	N/A	0.10	5.22E+00	2.25E-04	4.00E+02	#NUM!	1.46E-04	N/A	N/A	2.0E-01
95501 1,2-Dichlorobenzene	1.75E-04	1.59E-02	1.65E-02	1.59E-02	30.48	52.12	N/A	0.10	5.22E+00	1.59E-02	4.00E+02	2.87E+05	2.04E-04	N/A	N/A	N/A
84173 1,2-Dichlorobenzene, 1,3-	1.75E-04	2.59E-04	2.49E-04	2.49E-04	30.48	52.12	N/A	0.10	5.22E+00	2.59E-04	4.00E+02	#NUM!	1.51E-04	N/A	N/A	N/A
106487 1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.25E-04	30.48	52.12	1.64E+01	0.10	5.22E+00	4.38E-04	4.00E+02	1.36E+194	1.70E-04	2.79E-03	N/A	8.0E-01
78933 Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.34E-04	30.48	52.12	N/A	0.10	5.22E+00	9.45E-04	4.00E+02	1.05E+90	1.89E-04	N/A	N/A	N/A
67641 Acetone	1.75E-04	2.07E-03	2.08E-03	2.08E-03	30.48	52.12	N/A	0.10	5.22E+00	2.07E-03	4.00E+02	1.40E+41	1.87E-04	N/A	N/A	N/A
71432 Benzene	1.75E-04	5.42E-04	5.07E-04	5.20E-04	30.48	52.12	8.68E+00	0.10	5.22E+00	5.42E-04	4.00E+02	1.40E+157	1.76E-04	1.53E-03	7.8E-05	3.0E-02
74839 Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.29E-04	30.48	52.12	N/A	0.10	5.22E+00	4.46E-04	4.00E+02	5.67E+190	1.70E-04	N/A	N/A	5.0E-03
75160 Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.09E-04	30.48	52.12	N/A	0.10	5.22E+00	6.34E-04	4.00E+02	1.39E+134	1.79E-04	N/A	N/A	7.0E-01
106907 Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.37E-04	30.48	52.12	N/A	0.10	5.22E+00	4.55E-04	4.00E+02	9.00E+186	1.71E-04	N/A	N/A	5.0E-02
75003 Ethyl Chloride	1.75E-04	7.69E-04	7.16E-04	7.34E-04	30.48	52.12	N/A	0.10	5.22E+00	7.69E-04	4.00E+02	1.93E+111	1.83E-04	N/A	N/A	1.0E+01
67663 Chloroform	1.75E-04	6.43E-04	6.02E-04	6.17E-04	30.48	52.12	N/A	0.10	5.22E+00	6.43E-04	4.00E+02	2.93E+132	1.80E-04	N/A	N/A	2.3E-05
156592 cis-1,2-Dichloroethylene	1.75E-04	4.69E-04	4.30E-04	4.41E-04	30.48	52.12	7.02E+02	0.10	5.22E+00	4.59E-04	4.00E+02	3.62E+185	1.71E-04	1.20E-01	N/A	2.0E-01
110627 Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.65E-04	30.48	52.12	N/A	0.10	5.22E+00	4.85E-04	4.00E+02	3.54E+175	1.73E-04	N/A	N/A	N/A
100414 Ethylbenzene	1.75E-04	4.90E-04	4.31E-04	4.42E-04	30.48	52.12	N/A	0.10	5.22E+00	4.60E-04	4.00E+02	9.50E+184	1.71E-04	N/A	N/A	1.0E+00
88028 Isopropylbenzene	1.75E-04	3.95E-04	3.79E-04	3.79E-04	30.48	52.12	N/A	0.10	5.22E+00	3.95E-04	4.00E+02	2.06E+215	1.67E-04	N/A	N/A	4.0E-01
106972 Methyl cyclohexane	1.75E-04	3.99E-04	3.59E-04	3.75E-04	30.48	52.12	N/A	0.10	5.22E+00	3.99E-04	4.00E+02	2.55E+142	1.76E-04	N/A	N/A	3.0E+00
763404 Methyl-Tertiary-Butyl Ether	1.75E-04	6.87E-04	6.28E-04	6.43E-04	30.48	52.12	N/A	0.10	5.22E+00	6.87E-04	4.00E+02	4.02E+127	1.81E-04	N/A	N/A	3.0E+00
78092 Methylene chloride	1.75E-04	6.35E-04	5.96E-04	6.10E-04	30.48	52.12	N/A	0.10	5.22E+00	6.35E-04	4.00E+02	1.12E+134	1.80E-04	N/A	N/A	4.7E-07
127184 Tetrahydrofuran	1.75E-04	4.39E-04	4.11E-04	4.21E-04	30.48	52.12	1.41E+02	0.10	5.22E+00	4.39E-04	4.00E+02	9.93E+193	1.70E-04	2.39E-02	5.3E-05	N/A
109883 Toluene	1.75E-04	5.34E-04	5.00E-04	5.13E-04	30.48	52.12	N/A	0.10	5.22E+00	5.34E-04	4.00E+02	2.51E+159	1.75E-04	N/A	N/A	4.0E-01
159905 trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.14E-04	30.48	52.12	N/A	0.10	5.22E+00	4.32E-04	4.00E+02	1.37E+197	1.69E-04	N/A	N/A	2.0E-01
79016 Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.64E-04	30.48	52.12	4.43E+03	0.10	5.22E+00	4.83E-04	4.00E+02	1.52E+178	1.73E-04	7.6E-01	N/A	4.0E-02
78014 Vinyl chloride	1.75E-04	6.44E-04	6.05E-04	6.19E-04	30.48	52.12	1.47E+02	0.10	5.22E+00	6.44E-04	4.00E+02	1.46E+152	1.80E-04	2.04E-02	8.8E-06	1.0E-01
1300207 Xylene	1.75E-04	3.75E-03	3.81E-03	3.79E-03	30.48	52.12	N/A	0.10	5.22E+00	3.75E-03	4.00E+02	5.06E+22	2.01E-04	N/A	N/A	1.0E-01
88462 Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.62E-03	30.48	52.12	N/A	0.10	5.22E+00	2.60E-03	4.00E+02	5.59E+32	1.89E-04	N/A	N/A	N/A
91203 Naphthalene	1.75E-04	4.75E-04	4.50E-04	4.57E-04	30.48	52.12	5.86E+00	0.10	5.22E+00	4.75E-04	4.00E+02	1.34E+181	1.72E-04	1.53E-03	N/A	3.0E-03
91576 Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.02E-04	30.48	52.12	N/A	0.10	5.22E+00	3.13E-04	4.00E+02	4.83E+271	1.59E-04	N/A	N/A	3.0E-03
92524 Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.08E-04	30.48	52.12	N/A	0.10	5.22E+00	3.15E-04	4.00E+02	2.33E+270	1.69E-04	N/A	N/A	N/A
208986 Acenaphthylene	1.75E-04	3.38E-04	3.22E-04	3.28E-04	30.48	52.12	N/A	0.10	5.22E+00	3.38E-04	4.00E+02	1.29E+252	1.62E-04	N/A	N/A	3.0E-03
83329 Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.32E-04	30.48	52.12	N/A	0.10	5.22E+00	7.33E-04	4.00E+02	1.12E+119	1.83E-04	N/A	N/A	3.0E-03
96737 Azobenzene	1.75E-04	8.16E-01	8.39E-01	8.30E-01	30.48	52.12	N/A	0.10	5.22E+00	8.16E-01	4.00E+02	1.27E+00	9.61E-04	N/A	N/A	3.0E-03
35018 Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.44E-04	30.48	52.12	1.03E+01	0.10	5.22E+00	3.50E-04	4.00E+02	3.05E+243	1.64E-04	1.68E-03	N/A	3.0E-03
120127 Anthracene	1.75E-04	1.60E-03	1.62E-03	1.61E-03	30.48	52.12	N/A	0.10	5.22E+00	1.60E-03	4.00E+02	2.22E+53	1.95E-04	N/A	N/A	3.0E-03
C9-C18 Aliphatics	1.75E-04	3.64E-04	3.49E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.13E+234	1.84E-04	N/A	N/A	2.0E-01
C11-C22 C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.13E-04	30.48	52.12	N/A	0.10	5.22E+00	4.27E-04	4.00E+02	2.20E+199	1.89E-04	N/A	N/A	5.0E-02
C9-C9 C9-C9 Aliphatics	1.75E-04	3.64E-04	3.49E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.12E+234	1.84E-04	N/A	N/A	2.0E-01
C9-C10 C9-C10 Aromatics	1.75E-04	3.69E-04	3.46E-04	3.55E-04	30.48	52.12	N/A	0.10	5.22E+00	3.69E-04	4.00E+02	2.64E+230	1.65E-04	N/A	N/A	5.0E-02
C9-C12 C9-C12 Aliphatics	1.75E-04	3.64E-04	3.49E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.13E+234	1.84E-04	N/A	N/A	2.0E-01

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

	Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556 1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	NA
76131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005 1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343 1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	NA
75354 1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	4.2E-05
120821 1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501 1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731 Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467 1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	2.2E-06
78933 Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641 Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432 Benzene	NA	NA	NA	1.75E+06	NA	2.2E-10	3.2E-05
74839 Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150 Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907 Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	NA
75003 Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663 Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592 cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	3.8E-04
110827 Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414 Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	NA
98828 Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872 Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044 Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092 Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184 Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	2.6E-09	NA
108883 Toluene	NA	NA	NA	5.26E+05	NA	NA	NA
156605 trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	NA
79016 Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	1.2E-02
75014 Vinyl chloride	NA	NA	NA	2.76E+06	NA	4.2E-09	1.7E-04
1330207 Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862 Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203 Naphthalene	NA	NA	NA	3.10E+04	NA	NA	3.3E-04
91576 Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524 Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968 Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329 Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737 Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85016 Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	3.6E-04
120127 Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18 C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	NA
C11-C22 C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8 C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	NA
C9-C10 C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12 C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	NA

95% UCL
Cancer
Risk
TOTAL: 7E-09

95% UCL
HI
TOTAL: 1E-02

☐ = Cancer risk > 1E-05
or HQ/HI > 1E+00

Appendix C.4

Johansen & Ethelberg Model - Data Entry Screen
 Intrusion of Volatiles from Groundwater
 Future Child Recreational Scenario - RME
 Southwest Properties, Wells G&H Superfund Site, Coverable Unit 2
 Whiteley Baril

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
 (enter "X" in "YES" box and initial groundwater conc., below)

YES

X

ENTER	YES	<input checked="" type="checkbox"/>																	
ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Chemical CAS No. (numbers only, no dashes)	ENTER 95% UCL groundwater conc., C _w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L _p (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil groundwater temperature, T _a (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone soil dry bulk density, ρ _b (g/cm ³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm ³ /cm ³)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _c (yr)	ENTER Averaging time for noncarcinogens, AT _{nc} (yr)	ENTER Exposure duration, ED (yr)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hr/day)	ENTER Conversion factor CF (hr/day)
71868	1,1,1-Trichloroethane	4.82E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
78131	Trichloro-2,2-Dichloroethane, 1,1,2		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
78005	1,1,2-Trichloroethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
78343	1,1-Dichloroethane	1.20E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
78344	1,1-Dichloroethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
120821	1,2,4-Trichlorobenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
95501	1,2-Dichlorobenzene	7.43E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
941731	Dichlorobenzene, 1,2	1.80E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
109497	1,4-Dichlorobenzene	1.97E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
78833	Benzene, 2, (MERC)		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
87941	Aceitane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
71432	Benzene	8.80E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
74859	Propionethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75150	Carbon Dioxide		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
108907	Chlorobenzene	1.80E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75003	Ethyl Chloride		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
67893	Chloroform		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
116592	dim-1,2-Dichloroethane	4.80E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
110921	Cyclohexane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
10414	Styrene	4.00E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
98828	Isopropylbenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
108872	Methyl cyclohexane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
1634044	Methyl-Tertary-Butyl Ethyl	5.40E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75092	Methylene chloride		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
127184	Toluene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
109893	Tetachloroethane	1.20E+03	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
156905	Isopropyl-2-Dichloroethane	1.60E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
79015	Trichloroethane	2.00E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75014	Vinyl chloride	4.20E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
133207	Xylene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
85862	Acetateethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
81203	Methylacetone	9.80E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
81529	Methoxyacetylene, 2		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
92324	Butanol, 1,1-		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
203658	Acetoneethane	3.20E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
83329	Acetoneethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76137	Fluorene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
85018	Phenylacetone	3.10E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
120127	Anthracene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
02-C18	C9-C18 Alkylates	5.90E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
011-022	C11-C22 Aromatics		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
05-C4	C5-C8 Alkylates	4.48E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
09-C10	C9-C10 Aromatics		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
09-C12	C9-C12 Alkylates	5.30E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780

Note:
 1) Default soil parameters from Table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n_t), and soil dry bulk density (ρ_b).

Whitney Barrel

Chemical	CAS No.	Chemical	Henry's law constant		Henry's law constant		Enthalpy of vaporization at		Organic carbon partition coefficient, K_{oc}	Pure component water solubility, S	Unit risk factor, URF	Reference conc., RfC	
			Diffusivity in air, D_a	Diffusivity in water, D_w	at reference temperature, H	at reference temperature, T_R	the normal boiling point, $\Delta H_{v,b}$	Normal boiling point, T_b					Critical temperature, T_c
			(cm ² /s)	(cm ² /s)	(atm·m ³ /mol)	(°C)	(cal/mol)	(°K)					(°K)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00	
76131	Trichloro-1,2,2-trifluoroethane, 1,1,1,2-Trichloroethane	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01	
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00	
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01	
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01	
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01	
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.82E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A	
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A	
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01	
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A	
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A	
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02	
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03	
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01	
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02	
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01	
67683	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02	
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01	
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A	
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00	
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01	
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,286	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00	
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00	
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00	
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A	
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01	
156805	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01	
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02	
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01	
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01	
98862	Acetophenone	6.00E-02	6.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A	
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	481.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03	
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03	
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A	
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03	
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03	
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03	
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03	
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03	
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01	
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02	
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01	
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02	
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01	

Appendix C.4
 Johnson & Ettinger Model - Calculations Screen
 Inhalation of Volatiles from Groundwater
 Future Old Remedial Scenario - R4E
 Southwest Properties, Wells O&H Superfund Site, Operable Unit 2
 Whitney Canal

		Source building vegetation, L_v (cm)	Vadose zone soil air-filled porosity, θ_a (%)	Vadose zone effective total fluid saturation, S_{fe} (cm ³ /cm ³)	Vadose zone intrinsic permeability, k_i (cm ²)	Vadose zone soil relative air permeability, k_{ra} (cm ²)	Vadose zone soil effective vapor permeability, k_{ve} (cm ²)	Thickness of capillary zone, h_c (cm)	Total porosity in capillary zone, n_c (cm ³ /cm ³)	Air-filled porosity in capillary zone, θ_{ca} (cm ³ /cm ³)	Water-filled porosity in capillary zone, θ_{cw} (cm ³ /cm ³)	Floor- wall seepage parameter, $X/crack$ (cm)	Bldg. ventilation rate, Q_{bldg} (cm ³ /s)	Area of enclosed space below grade, A_b (cm ²)	Crack- to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,s}$ (cal/mole)	Henry's law constant at ave. groundwater temperature, $H_{v,s}$ (atm-m ³ /mole)	Henry's law constant at ave. ground surface temperature, $H_{v,g}$ (unitless)	Vapor velocity at ave. soil temperature, $v_{v,s}$ (g/cm-s)
71556	1,1,1-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.395	8.50E-03	3.66E-01	1.75E-04
78131	Trichloro-1,2,2,2-tetrafluoroethane, 1,1,2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.436	4.85E-01	1.99E+01	1.76E-04
79005	1,1,2,2-Tetrachloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.672	3.66E-04	1.67E-02	1.76E-04
78343	1,1,1-Dichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.450	2.86E-03	1.24E-01	1.75E-04
76354	1,1,1-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6.302	2.86E-03	1.24E-01	1.75E-04
120521	1,2,2-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	13.230	4.35E-04	1.67E-02	1.76E-04
96601	1,2-Dichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.521	1.41E-06	8.09E-05	1.75E-04
561731	Dichlorobenzene, 1,3-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.503	4.11E-03	1.77E-01	1.76E-04
106487	1,4-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.243	8.86E-04	3.83E-02	1.76E-04
78933	Butenes, 2, (MKG)	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.495	4.90E-05	2.11E-03	1.75E-04
87841	Acetone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.559	1.87E-05	8.60E-04	1.76E-04
71432	Benzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8.122	3.58E-03	1.19E-01	1.76E-04
74339	Bromomethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.337	3.52E-03	2.34E-01	1.75E-04
78150	Carbon Dioxide	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.682	6.99E-03	3.01E-01	1.75E-04
104997	Chlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.803	1.54E-03	6.61E-02	1.76E-04
75073	Ethyl Chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.201	7.79E-03	3.35E-01	1.76E-04
67963	Chloroform	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.854	1.86E-03	8.02E-02	1.75E-04
155592	cis-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.734	2.04E-03	8.77E-02	1.75E-04
110427	Cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.486	1.76E+00	7.84E+01	1.75E-04
100414	Ethylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	10.153	3.18E-03	1.31E-01	1.76E-04
96528	Isopropylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.540	1.26E-02	5.51E-01	1.76E-04
106872	Methylcyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.505	3.70E-01	1.56E+01	1.76E-04
1634044	Methyl-Tert-butyl Ether	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.447	5.16E-04	2.22E-02	1.76E-04
76092	Methylacetylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.634	1.17E-03	5.03E-02	1.75E-04
127154	Tetrachloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.653	7.83E-03	3.37E-01	1.76E-04
106853	Toluene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.154	2.82E-03	1.25E-01	1.76E-04
156906	trans-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.417	6.47E-03	3.56E-01	1.76E-04
78016	Trichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8.557	4.73E-03	2.09E-01	1.75E-04
78014	Vinyl chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.005	1.72E-02	7.49E-01	1.76E-04
1330267	Xylenes	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.542	5.85E-06	2.83E-04	1.76E-04
91203	Naphthalene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.818	6.91E-06	3.83E-04	1.76E-04
61676	Methylsulfolane, 2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	12.913	1.52E-04	6.55E-03	1.75E-04
92524	Biphenyl, 1,1'	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.806	5.85E-04	3.81E-02	1.76E-04
206968	Acanaphthylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.472	2.99E-04	1.14E-02	1.75E-04
83355	Acanaphthylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.513	7.45E-04	1.05E-02	1.75E-04
56737	Fluorene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	18.123	3.87E-06	1.58E-03	1.76E-04
55018	Phenanthrene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	16.225	2.20E-06	9.48E-07	1.75E-04
126127	Anthracene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.478	1.14E-04	4.90E-03	1.76E-04
CB-C18	CB-C18 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	18.863	1.26E-05	5.43E-04	1.76E-04
CB-C19	CB-C19 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	5.29E-01	3.86E+01	1.76E-04
CB-C20	CB-C20 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.60E-04	1.55E-02	1.75E-04
CB-C10	CB-C10 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	6.48E-01	2.79E+01	1.75E-04
CB-C12	CB-C12 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.08E-03	1.70E-01	1.75E-04

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Evaluation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wake B&H Superfund Site, Operable Unit 2
Whitney Barrel

		Vadose zone effective diffusion coefficient, D_v^e (cm ² /s)	Capillary zone effective diffusion coefficient, D_v^c (cm ² /s)	Total overall effective diffusion coefficient, D_v^t (cm ² /s)	Diffusion path length, L_d (cm)	Convection path length, L_c (cm)	Source vapor conc., C_{soil} (ug/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D_{crack}^e (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent Pachet number, n_p (unitless)	Infinite source indoor attenuation coefficient, λ (unitless)	Infinite source bldg conc., C_{bldg} (ug/m ³)	Unit risk factor, URF (ug/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71566	1,1,1-Trichloroethane	4.75E-04	4.45E-04	4.85E-04	59.98	15	1.69E+03	0.10	2.74E+01	4.75E-04	1.23E+03	4.36E+304	7.92E-06	1.34E-02	N/A	2.2E+01
78131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.93E-04	1.71E-04	59.98	15	N/A	0.10	2.74E+01	1.75E-04	1.23E+03	N/A	5.40E-05	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	5.24E-04	4.96E-04	5.15E-04	59.98	15	N/A	0.10	2.74E+01	5.24E-04	1.23E+03	8.58E+275	8.14E-06	N/A	1.8E-05	2.2E+00
79343	1,1-Dichloroethane	4.55E-04	4.26E-04	4.49E-04	59.98	15	1.48E+04	0.10	2.74E+01	4.55E-04	1.23E+03	N/A	7.84E-06	1.17E-01	N/A	6.0E-01
79354	1,1-Dichloroethylene	6.47E-04	6.12E-04	6.36E-04	59.98	15	N/A	0.10	2.74E+01	6.47E-04	1.23E+03	3.82E+264	8.23E-06	N/A	N/A	2.0E-01
120921	1,2,4-Trichlorobenzene	2.25E-04	2.14E-04	2.22E-04	59.98	15	N/A	0.10	2.74E+01	2.25E-04	1.23E+03	N/A	6.10E-06	N/A	N/A	2.0E-01
95601	1,2-Dichlorobenzene	1.56E-02	1.80E-02	1.87E-02	59.98	15	4.52E+01	0.10	2.74E+01	1.56E-02	1.23E+03	1.91E+250	1.08E-05	4.84E-06	N/A	N/A
941731	Dichlorobenzene, 1,3-	2.56E-04	2.40E-04	2.51E-04	59.98	15	3.38E+02	0.10	2.74E+01	2.56E-04	1.23E+03	N/A	6.43E-06	2.18E-02	N/A	N/A
100487	1,4-Dichlorobenzene	4.38E-04	4.12E-04	4.30E-04	59.98	15	7.54E+03	0.10	2.74E+01	4.38E-04	1.23E+03	N/A	7.75E-06	5.84E-02	N/A	8.0E-01
78933	Butanone, 2- (MEK)	9.45E-04	9.27E-04	9.45E-04	59.98	15	N/A	0.10	2.74E+01	9.45E-04	1.23E+03	1.18E+153	9.18E-06	N/A	N/A	N/A
67641	Acetone	2.27E-03	2.09E-03	2.07E-03	59.98	15	N/A	0.10	2.74E+01	2.07E-03	1.23E+03	9.18E+099	1.00E-05	N/A	N/A	N/A
71432	Benzene	6.42E-04	6.07E-04	6.30E-04	59.98	15	9.95E+03	0.10	2.74E+01	6.42E-04	1.23E+03	1.61E+267	8.20E-06	5.19E-02	7.8E-06	3.2E-02
74636	Bromomethane	4.48E-04	4.18E-04	4.37E-04	59.98	15	N/A	0.10	2.74E+01	4.48E-04	1.23E+03	N/A	7.79E-06	N/A	N/A	6.0E-03
76150	Carbon Dioxide	6.34E-04	5.84E-04	6.21E-04	59.98	15	N/A	0.10	2.74E+01	6.34E-04	1.23E+03	1.25E+228	8.50E-06	N/A	N/A	7.0E-01
108907	Chlorobenzene	4.55E-04	4.27E-04	4.48E-04	59.98	15	1.20E+03	0.10	2.74E+01	4.55E-04	1.23E+03	N/A	7.83E-06	9.37E-03	N/A	6.0E-02
75023	Ethyl Chloride	7.56E-04	7.18E-04	7.49E-04	59.98	15	N/A	0.10	2.74E+01	7.56E-04	1.23E+03	1.74E+189	8.83E-06	N/A	N/A	1.0E+01
67663	Chloroform	6.43E-04	6.02E-04	6.29E-04	59.98	15	N/A	0.10	2.74E+01	6.43E-04	1.23E+03	1.76E+225	8.53E-06	N/A	2.3E-05	5.0E-02
156962	cis-1,2-Dichloroethylene	4.59E-04	4.30E-04	4.49E-04	59.98	15	4.21E+04	0.10	2.74E+01	4.59E-04	1.23E+03	N/A	7.85E-06	3.30E-01	N/A	2.2E-01
110627	Cyclohexane	4.85E-04	4.53E-04	4.75E-04	59.98	15	N/A	0.10	2.74E+01	4.85E-04	1.23E+03	3.18E+290	7.97E-06	N/A	N/A	N/A
102414	Ethylbenzene	4.90E-04	4.31E-04	4.51E-04	59.98	15	5.47E+03	0.10	2.74E+01	4.90E-04	1.23E+03	N/A	7.85E-06	4.30E-02	N/A	1.0E+01
98128	Isopropylbenzene	3.95E-04	3.81E-04	3.87E-04	59.98	15	N/A	0.10	2.74E+01	3.95E-04	1.23E+03	N/A	7.51E-06	N/A	N/A	4.0E-01
105872	Methyl cyclohexane	6.98E-04	6.58E-04	6.65E-04	59.98	15	N/A	0.10	2.74E+01	6.98E-04	1.23E+03	1.50E+242	8.59E-06	N/A	N/A	3.0E+00
1834044	Methyl Tertiary Butyl Ether	6.67E-04	6.26E-04	6.54E-04	59.98	15	1.20E+04	0.10	2.74E+01	6.67E-04	1.23E+03	9.48E+216	8.90E-06	1.03E-01	N/A	3.0E+00
75062	Methylene chloride	6.35E-04	5.96E-04	6.22E-04	59.98	15	N/A	0.10	2.74E+01	6.35E-04	1.23E+03	8.55E+227	8.51E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	4.30E-04	4.11E-04	4.30E-04	59.98	15	N/A	0.10	2.74E+01	4.30E-04	1.23E+03	N/A	7.75E-06	N/A	6.9E-06	N/A
101883	Toluene	5.34E-04	5.00E-04	5.21E-04	59.98	15	1.51E+05	0.10	2.74E+01	5.34E-04	1.23E+03	1.10E+271	8.17E-06	1.23E+00	N/A	4.0E-01
156609	trans-1,2-Dichloroethylene	4.37E-04	4.04E-04	4.20E-04	59.98	15	5.36E+03	0.10	2.74E+01	4.37E-04	1.23E+03	N/A	7.71E-06	4.13E-02	N/A	2.0E-01
79018	Trichloroethylene	4.93E-04	4.52E-04	4.73E-04	59.98	15	4.13E+02	0.10	2.74E+01	4.93E-04	1.23E+03	3.77E+290	7.96E-06	3.28E-03	N/A	4.0E-02
76014	Vinyl chloride	6.44E-04	6.02E-04	6.30E-04	59.98	15	3.13E+05	0.10	2.74E+01	6.44E-04	1.23E+03	5.27E+224	8.53E-06	2.87E+00	8.8E-06	1.0E-01
133027	Xylene	3.79E-03	3.61E-03	3.77E-03	59.98	15	N/A	0.10	2.74E+01	3.79E-03	1.23E+03	4.93E+38	1.04E-05	N/A	N/A	1.0E-01
98963	Acetophenone	2.69E-03	2.64E-03	2.67E-03	59.98	15	N/A	0.10	2.74E+01	2.69E-03	1.23E+03	4.82E+055	1.02E-05	N/A	N/A	N/A
91223	Naphthalene	4.13E-04	4.50E-04	4.64E-04	59.98	15	5.29E+01	0.10	2.74E+01	4.13E-04	1.23E+03	9.87E+307	7.92E-06	4.94E-04	N/A	3.0E-03
91878	Methylnaphthalene, 2-	3.13E-04	2.95E-04	3.07E-04	59.98	15	N/A	0.10	2.74E+01	3.13E-04	1.23E+03	N/A	5.95E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	3.15E-04	3.01E-04	3.10E-04	59.98	15	N/A	0.10	2.74E+01	3.15E-04	1.23E+03	N/A	6.88E-06	N/A	N/A	N/A
205968	Acenaphthylene	3.22E-04	3.22E-04	3.33E-04	59.98	15	3.37E+01	0.10	2.74E+01	3.22E-04	1.23E+03	N/A	7.15E-06	2.41E-04	N/A	3.0E-03
83329	Acenaphthene	7.33E-04	7.31E-04	7.33E-04	59.98	15	N/A	0.10	2.74E+01	7.33E-04	1.23E+03	2.13E+197	8.79E-06	N/A	N/A	3.0E-03
98737	Fluorene	6.19E-01	6.35E-01	6.25E-01	59.98	15	N/A	0.10	2.74E+01	6.19E-01	1.23E+03	1.50E+030	3.24E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	3.50E-04	3.41E-04	3.47E-04	59.98	15	1.52E+01	0.10	2.74E+01	3.50E-04	1.23E+03	N/A	7.35E-06	1.10E-04	N/A	3.0E-03
120127	Anthracene	1.60E-03	1.62E-03	1.60E-03	59.98	15	N/A	0.10	2.74E+01	1.60E-03	1.23E+03	5.14E+00	9.81E-06	N/A	N/A	3.0E-03
CP-C18	CP-C18 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.98	15	2.10E+06	0.10	2.74E+01	3.64E-04	1.23E+03	N/A	7.32E-06	1.54E+01	N/A	2.0E-01
CP-C18	CP-C18 Aromatics	4.27E-04	4.05E-04	4.25E-04	59.98	15	N/A	0.10	2.74E+01	4.27E-04	1.23E+03	N/A	7.70E-06	N/A	N/A	5.0E-02
CP-C18	CP-C18 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.98	15	1.25E+07	0.10	2.74E+01	3.64E-04	1.23E+03	N/A	7.32E-06	8.14E-01	N/A	7.0E-01
CP-C10	CP-C10 Aromatics	3.69E-04	3.46E-04	3.62E-04	59.98	15	N/A	0.10	2.74E+01	3.69E-04	1.23E+03	N/A	7.33E-06	N/A	N/A	5.0E-02
CP-C12	CP-C12 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.98	15	1.64E+06	0.10	2.74E+01	3.64E-04	1.23E+03	N/A	7.32E-06	1.23E+01	N/A	2.0E-01

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	1.4E-07
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	5.2E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	NA
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	1.6E-06
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.2E-09	6.1E-05
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	3.5E-06
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	3.7E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	9.6E-07
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
38872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	7.6E-07
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	NA	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	6.9E-05
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	4.6E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	1.8E-06
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	4.5E-08	5.9E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	3.7E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	1.8E-06
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	8.2E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	1.7E-03
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.0E-02
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	1.4E-03

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-08	1E-02

 = Cancer risk > 1E-05
 or HQ/HI > 1E+00

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES ☐ OR ☐

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES ☐ X ☒

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Chemical CAS No. (numbers only, no dashes)	99% UCL groundwater conc., C _{gw} (µg/L)	Depth below grade to bottom of enclosed space floor, L _v (15 or 200 cm)	Depth below grade to water table, L _{WT} (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, T _s (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	User-defined vadose zone soil vapor permeability, k _v (cm ²)	Vadose zone soil dry bulk density, ρ _b (g/cm ³)	Vadose zone soil total porosity, n ^v (unitless)	Vadose zone soil water-filled porosity, θ _w (cm ³ /cm ³)	ENTER Time risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _c (yrs)	ENTER Averaging time for noncarcinogens, AT _{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days)	ENTER Exposure time ET (hr/day)	ENTER Conversion factor CF (hr-hr)		
71666	1,1,1-Trichloroethene	4.62E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
72121	Trichloro-1,2,2-trifluoroethane, 1,1,2		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
76025	1,1,2,2-Tetrachloroethane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
75343	1,1,1-Dichloroethane	2.54E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
76334	1,1-Dichlorobenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
120581	1,2,4-Trichlorobenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
95501	1,2-Dichlorobenzene	7.43E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
941731	Dichlorobenzene, 1,3	5.10E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
105487	1,4-Dichlorobenzene	4.11E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
78933	Benzene, A, (HCB)		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
67941	Acetone		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
71432	Benzene	2.13E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
74839	Bromobenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
75150	Carbon Disulfide		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
103907	Chlorobenzene	4.90E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
75903	Ethyl Chloride		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
67663	Chloroform		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
155582	cis-1,2-Dichloroethene	9.74E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
112827	Cyclohexane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
100414	Ethylbenzene	1.01E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
95576	Isopropylbenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
103912	Methylcyclohexane		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
1854944	Methyl-Tertiary-Butyl Ether	1.2E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
76062	Methylene chloride		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
127184	Tetrachloroethene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
105863	Toluene	2.45E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
156805	trans-1,2-Dichloroethene	4.30E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
75015	Trichloroethene	2.00E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
75014	Vinyl chloride	8.50E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
1330207	Xylenes		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
95992	Azobenzene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
91203	Dimethylsiloxane, 2	9.00E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
91576	Methyldimethylsiloxane, 2		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
92424	Buthene, 1,1-		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
205868	Acenaphthene	3.20E+00	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
33320	Acenaphthene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
95137	Fluorene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
82018	Phenanthrene	3.10E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
120127	Anthracene		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
CE-C18	CE-C18 Aromatic	4.95E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
CE-C22	CE-C22 Aromatic		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
CE-C8	CE-C8 Aromatic	1.64E+02	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
CE-C16	CE-C16 Aromatic		15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
CE-C12	CE-C12 Aromatic	2.87E+01	15	74.98	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760	
Note:																				

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Surface Vapor Intrusion into Building (U.S. EPA June 18, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n_t), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

Chemical CAS No.	Chemical	Diffusivity in air, D _a (cm ² /s)	Diffusivity in water, D _w (cm ² /s)	Henry's law constant at reference temperature, H (atm·m ³ /mol)	Henry's law constant reference temperature, T _R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH _{v,b} (cal/mol)	Normal boiling point, T _B (°K)	Critical temperature, T _C (°K)	Organic carbon partition coefficient, K _{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	366.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	8.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.80E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
87663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.85	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.38	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,284	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	8.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	8.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	8.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C-4
Johnson & Etlinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Wetmore Barn

		Source building separation, L_f (cm)	Vadose zone soil air-filled porosity, θ_a^* (cm ³ /cm ³)	Vadose zone effective total fluid saturation, S_{fe} (cm ³ /cm ³)	Vadose zone soil intrinsic permeability, k_i (cm ²)	Vadose zone soil relative air permeability, k_{ra} (cm ²)	Vadose zone soil effective vapor permeability, k_v (cm ²)	Thickness of capillary zone, L_w (cm)	Total porosity in capillary zone, n_w (cm ³ /cm ³)	Air-filled porosity in capillary zone, θ_{wa} (cm ³ /cm ³)	Water-filled porosity in capillary zone, θ_{ws} (cm ³ /cm ³)	Floor-wall seam crack, C_{fws} (cm)	Bldg ventilation rate, Q_{vent} (cm ³ /s)	Area of enclosed space below grade, A_g (cm ²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization of ave. groundwater temperature, $\Delta H_{v,ave}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{ow} (atm-m ³ /mol)	Henry's law constant at vs. groundwat temperature, H_{ov} (unitless)
71556	1,1,1-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.886	8.50E-03	3.66E+01
78131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.436	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.572	3.89E-04	1.87E+02
79343	1,1-Dichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.450	2.88E-02	1.24E+01
79354	1,1-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.392	1.47E-02	6.34E-01
120821	1,2-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	13.290	4.35E-04	1.87E-02
95591	Dichlorobenzene, 1,3-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.521	6.09E-05	0.00E+00
941731	1,4-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.503	4.11E-03	7.75E-01
106487	Butanone, 2- (MEK)	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	11.243	8.09E-04	3.83E-02
78833	Acetone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.486	4.90E-05	2.11E-03
67641	Benzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.559	1.97E-05	8.50E-04
71432	Bromobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8.122	2.89E-03	1.18E-01
74839	Carbon Disulfide	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.337	5.52E-03	2.39E-01
75150	Chlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6.682	6.95E-03	3.01E-01
108907	Ethyl Chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.803	1.54E-02	6.65E-02
75003	Chloroform	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.201	7.79E-03	3.35E-01
67563	cis-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.554	1.86E-03	8.02E-02
156592	cis-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.734	2.04E-03	8.77E-02
110827	Ethylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.486	1.75E+00	7.54E+01
100414	Isopropylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	10.155	3.19E-03	1.37E-01
98923	Methyl cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.540	1.28E-02	5.51E-01
108872	Methyl cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.508	3.70E-01	1.58E+01
1634044	Methyl-Tertiary-Butyl Ether	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.447	5.10E-04	2.22E-02
75082	Methylene chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7.034	1.17E-03	5.03E-02
127184	Tetrahydrofuran	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8.553	7.83E-03	3.37E-01
108863	Toluene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9.154	2.82E-03	1.26E-01
156605	trans-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.417	8.27E-03	3.96E-01
79016	Trichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8.537	4.79E-03	2.06E-01
75014	Vinyl chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.030	1.70E-02	7.46E-01
1330207	Xylenes	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5.000	1.70E-02	7.46E-01
98862	Acetophenone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.542	5.80E-06	2.52E-04
91203	Naphthalene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.818	8.91E-06	3.83E-04
91575	Methylnaphthalene, 2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	12.913	1.62E-04	6.55E-03
92824	Biphenyl, 1,1'-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.506	8.86E-04	3.81E-02
202668	Acenaphthylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.472	2.86E-04	1.14E-02
86328	Acenaphthene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.513	2.45E-04	1.05E-02
86737	Fluorene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	15.123	3.07E-05	1.58E-03
85918	Phenanthrene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	15.123	2.20E-06	9.45E-07
120127	Anthracene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1.479	1.14E-04	4.90E-03
C9-C18	C9-C18 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	1.29E-05	5.43E-04
C11-C22	C11-C22 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	8.28E-01	3.56E+01
C5-C8	C5-C8 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.60E-04	1.55E-02
C9-C10	C9-C10 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	6.48E-01	2.79E+01
C9-C12	C9-C12 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	2.96E-03	1.70E-01
		59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	7.80E-01	3.36E+01

Appendix C4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Oper.
Whitney Dam

		Vapor velocity at soil temperature, v_{ws} (g/cm-s)	Vadose zone effective diffusion coefficient, D_{vz}^* (cm ² /s)	Capillary zone effective diffusion coefficient, D_{cz}^* (cm ² /s)	Total overall effective diffusion coefficient, D_{to}^* (cm ² /s)	Diffusion path length, L_d (cm)	Convection path length, L_c (cm)	Source term concentration, C_{source} (µg/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into block, Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D_{crack}^* (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent foundation porosity, $n_p(Pa)$ (unitless)	Infinite source attenuation coefficient, α (unitless)	Infinite source block concentration, C_{block} (µg/m ³)	Unit risk factor, URF (µg/m ³) ⁻¹	Reference concentration, RfC (mg/m ³)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.65E-04	59.98	15	1.59E+03	0.10	2.74E+01	4.75E-04	1.23E+03	4.36E+304	7.32E-06	1.34E-02	N/A	2.2E+00
71631	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.83E-04	1.71E-04	59.98	15	N/A	0.10	2.74E+01	1.75E-04	1.23E+03	#NUM!	5.40E-06	N/A	N/A	3.0E+01
78005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.85E-04	5.15E-04	59.98	15	N/A	0.10	2.74E+01	5.24E-04	1.23E+03	8.56E+275	5.14E-06	N/A	1.5E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.53E-04	4.29E-04	4.49E-04	59.98	15	3.15E+03	0.10	2.74E+01	4.53E-04	1.23E+03	#NUM!	7.84E-06	2.47E-02	N/A	5.0E-01
75354	1,1-Dichloroethane	1.75E-04	5.47E-04	5.12E-04	5.36E-04	59.98	15	N/A	0.10	2.74E+01	5.47E-04	1.23E+03	3.62E+264	8.22E-06	N/A	N/A	2.0E-01
120221	1,2-Dichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.22E-04	59.98	15	N/A	0.10	2.74E+01	2.25E-04	1.23E+03	#NUM!	6.10E-06	N/A	N/A	2.0E-01
55501	1,2-Dichlorobenzene	1.75E-04	1.88E-04	1.80E-04	1.87E-04	59.98	15	4.52E+01	0.10	2.74E+01	1.88E-04	1.23E+03	1.91E+09	1.08E-05	4.86E-06	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.96E-04	2.40E-04	2.51E-04	59.98	15	9.02E+02	0.10	2.74E+01	2.96E-04	1.23E+03	#NUM!	6.43E-06	5.80E-03	N/A	N/A
106487	1,4-Dichlorobenzene	1.75E-04	4.39E-04	4.12E-04	4.30E-04	59.98	15	1.87E+03	0.10	2.74E+01	4.39E-04	1.23E+03	#NUM!	7.75E-06	1.22E-02	N/A	8.0E-01
78833	Butane, 2- (MBO)	1.75E-04	9.45E-04	8.27E-04	9.40E-04	59.98	15	N/A	0.10	2.74E+01	9.45E-04	1.23E+03	1.18E+153	9.18E-06	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.07E-03	59.98	15	N/A	0.10	2.74E+01	2.07E-03	1.23E+03	9.18E+09	1.00E-05	N/A	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.30E-04	59.98	15	2.46E+03	0.10	2.74E+01	5.42E-04	1.23E+03	1.61E+267	6.20E-06	2.02E-02	7.8E-06	3.0E-02
74839	Bromobenzene	1.75E-04	4.46E-04	4.18E-04	4.37E-04	59.98	15	N/A	0.10	2.74E+01	4.46E-04	1.23E+03	#NUM!	7.79E-06	N/A	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.21E-04	59.98	15	N/A	0.10	2.74E+01	6.34E-04	1.23E+03	1.25E+228	6.50E-06	N/A	N/A	7.0E-01
108807	Chlorobenzene	1.75E-04	4.27E-04	4.46E-04	4.46E-04	59.98	15	3.20E+02	0.10	2.74E+01	4.27E-04	1.23E+03	#NUM!	7.83E-06	2.55E-03	N/A	8.0E-02
75003	Ethyl Chloride	1.75E-04	7.96E-04	7.19E-04	7.49E-04	59.98	15	N/A	0.10	2.74E+01	7.96E-04	1.23E+03	1.14E+189	8.63E-06	N/A	N/A	1.0E+01
67663	Chloroform	1.75E-04	8.43E-04	8.02E-04	8.29E-04	59.98	15	N/A	0.10	2.74E+01	8.43E-04	1.23E+03	1.78E+225	8.63E-06	N/A	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.69E-04	4.30E-04	4.49E-04	59.98	15	8.54E+03	0.10	2.74E+01	4.69E-04	1.23E+03	#NUM!	7.85E-06	6.71E-02	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.89E-04	4.53E-04	4.75E-04	59.98	15	N/A	0.10	2.74E+01	4.89E-04	1.23E+03	3.16E+296	7.97E-06	N/A	#N/A	N/A
100414	Ethylbenzene	1.75E-04	4.80E-04	4.31E-04	4.51E-04	59.98	15	1.38E+03	0.10	2.74E+01	4.80E-04	1.23E+03	#NUM!	7.85E-06	1.09E-02	N/A	1.0E+00
88528	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.87E-04	59.98	15	N/A	0.10	2.74E+01	3.95E-04	1.23E+03	#NUM!	7.51E-06	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.99E-04	5.55E-04	5.85E-04	59.98	15	N/A	0.10	2.74E+01	5.99E-04	1.23E+03	1.50E+242	8.39E-06	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.97E-04	6.38E-04	6.54E-04	59.98	15	2.84E+03	0.10	2.74E+01	6.97E-04	1.23E+03	9.48E+216	8.60E-06	2.44E-02	N/A	3.0E+00
76092	Methylene chloride	1.75E-04	6.96E-04	5.99E-04	6.22E-04	59.98	15	N/A	0.10	2.74E+01	6.96E-04	1.23E+03	8.55E+227	8.51E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.30E-04	59.98	15	N/A	0.10	2.74E+01	4.39E-04	1.23E+03	#NUM!	7.75E-06	N/A	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.23E-04	59.98	15	3.00E+04	0.10	2.74E+01	5.34E-04	1.23E+03	1.10E+271	8.17E-06	2.52E-01	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.52E-04	4.04E-04	4.23E-04	59.98	15	1.53E+03	0.10	2.74E+01	4.52E-04	1.23E+03	#NUM!	7.71E-06	1.18E-02	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.53E-04	4.23E-04	4.33E-04	59.98	15	4.13E+02	0.10	2.74E+01	4.53E-04	1.23E+03	3.77E+299	7.96E-06	3.28E-03	N/A	4.0E-02
75014	Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.30E-04	59.98	15	6.34E+04	0.10	2.74E+01	6.44E-04	1.23E+03	5.27E+224	8.53E-06	5.41E-01	8.5E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.72E-03	3.81E-03	3.77E-03	59.98	15	N/A	0.10	2.74E+01	3.75E-03	1.23E+03	4.03E+08	1.04E-05	N/A	N/A	N/A
98962	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.64E-03	59.98	15	N/A	0.10	2.74E+01	2.60E-03	1.23E+03	4.82E+06	1.02E-05	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.64E-04	59.98	15	8.29E+01	0.10	2.74E+01	4.70E-04	1.23E+03	9.87E+307	7.92E-06	4.98E-04	N/A	3.0E-03
91676	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.85E-04	3.07E-04	59.98	15	N/A	0.10	2.74E+01	3.13E-04	1.23E+03	#NUM!	6.85E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.10E-04	59.98	15	N/A	0.10	2.74E+01	3.15E-04	1.23E+03	#NUM!	6.98E-06	N/A	N/A	N/A
206968	Acenaphthylene	1.75E-04	3.39E-04	3.22E-04	3.33E-04	59.98	15	3.37E+01	0.10	2.74E+01	3.39E-04	1.23E+03	#NUM!	7.15E-06	2.41E-04	N/A	3.0E-03
83328	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.33E-04	59.98	15	N/A	0.10	2.74E+01	7.33E-04	1.23E+03	2.13E+197	8.79E-06	N/A	N/A	3.0E-03
96737	Fluorene	1.75E-04	6.13E-04	6.39E-04	6.26E-04	59.98	15	N/A	0.10	2.74E+01	6.16E-04	1.23E+03	1.53E+00	3.24E-05	N/A	N/A	3.0E-03
86018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.47E-04	59.98	15	1.52E+01	0.10	2.74E+01	3.50E-04	1.23E+03	#NUM!	7.25E-06	1.10E-04	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.62E-03	1.62E-03	1.60E-03	59.98	15	N/A	0.10	2.74E+01	1.60E-03	1.23E+03	5.14E+90	9.81E-06	N/A	N/A	3.0E-03
C9-C15	C9-C15 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.66E-04	59.98	15	1.78E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	1.29E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.20E-04	59.98	15	N/A	0.10	2.74E+01	4.27E-04	1.23E+03	#NUM!	7.70E-06	N/A	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.66E-04	59.98	15	4.59E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	3.35E+01	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.69E-04	3.46E-04	3.62E-04	59.98	15	N/A	0.10	2.74E+01	3.69E-04	1.23E+03	#NUM!	7.35E-06	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.66E-04	59.98	15	8.95E+05	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	6.55E+00	N/A	2.0E-01

Appendix C.4

Johnson & Eltinger Model - Results

Inhalation of Volatiles from Groundwater

Future Child Recreational Scenario - CT

Southwest Properties, Wells G&H Superfund Site, Operable Unit 2

Whitney Barrel

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	4.5E-08
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	3.7E-07
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	NA
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	1.1E-07
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	3.3E-11	5.0E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	3.2E-07
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	2.5E-06
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	8.1E-08
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	6.0E-08
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	NA	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	4.7E-06
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	4.4E-07
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	6.1E-07
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	1.0E-09	4.0E-05
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	1.2E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	6.0E-07
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	2.7E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	4.8E-04
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.2E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	2.4E-04

	95% UCL	
	Cancer	95% UCL
	Risk	HI
TOTAL:	1E-09	2E-03

☐ = Cancer risk > 1E-05
or HQ/HI > 1E+00

END

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES

X

ENTER	Y88	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
CAS No. (numbers only, no dashes)	Chemical	ENTER 95% UCL groundwater conc., C _w (µg/L)	Depth below grade to bottom of enclosed space floor, L _p (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, T _g (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	User-defined vadose zone soil vapor permeability, k _v (cm ²)	Vadose zone soil dry bulk density, ρ _b (g/cm ³)	Vadose zone soil total porosity, n [*] (unitless)	Vadose zone soil water-filled porosity, θ _w [*] (cm ³ /cm ³)	Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _c (yrs)	Averaging time for noncarcinogens, AT _{nc} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure time ET (hrs/day)	Conversion factor CF (hrs/yr)
71860	1,1,1-Trichloroethane	6.37E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76005	1,1,2-Trichloroethane		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76343	1,1-Dichloroethane	7.24E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76354	1,1-Dichloroethene	6.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
120621	1,2,2-Trichloroethane		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
68601	1,2,4-Trichlorobenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
541731	1,2-Dichlorobenzene	1.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
106469	Dichlorobenzene, 1,2-		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75633	1,4-Dichlorobenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75633	Benzene, 2- (MEX)		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
87841	Acetone	2.42E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
71432	Benzene	6.84E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
74839	Bromobenzene	1.05E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75150	Carbon Disulfide		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
134603	Chlorobenzene	1.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75023	Ethyl Chloride	3.05E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
87883	Chloroform		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
154962	cis-1,2-Dichloroethylene	7.43E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
110837	Cyclohexane		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
100414	Ethylbenzene	7.81E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
98428	Isopropylbenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
108872	Methyl cyclohexane	7.09E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
183404	Methyl-Tert-Butyl Ether		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
75021	Methylene chloride	1.58E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
127184	Tetrahydrofuran	7.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
108833	Toluene	1.21E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
159603	trans-1,2-Dichloroethylene	1.00E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76016	Trichloroethylene	3.31E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
76014	Vinyl chloride	1.85E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
1330207	Xylenes		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
98862	Acetanaphthene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
91203	Naphthalene	2.09E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
91576	Methoxybenzene, 2-	5.89E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
92524	Biohexyl, 1,1-		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
204068	Acenaphthylene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
83326	Acenaphthene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
82037	Fluorene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
82016	Phenanthrene	5.74E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
126127	Anthracene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
C8-C16	C8-C16 Aliphatics	9.51E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
C11-C22	C11-C22 Aromatics	4.10E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
C5-C8	C5-C8 Aliphatics	1.15E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
C9-C10	C9-C10 Aromatics	7.10E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780
C9-C12	C9-C12 Aliphatics	3.30E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8780

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water-filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n_t), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm ² /s)	Diffusivity in water, D_w (cm ² /s)	Henry's law constant at reference temperature, H (atm-m ³ /mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (µg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71558	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.80E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98628	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108672	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	384.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	380.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98882	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Initiation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Property, Wells G&H Superfund Site, Oper.
Municipal Waste Oil

	Vapor velocity at ex. soil temperature, P_{10} (g/cm ³ /s)	Vadose zone effective diffusion coefficient, D_{10}^* (cm ² /s)	Capillary zone effective diffusion coefficient, D_{10}^* (cm ² /s)	Total overall effective diffusion coefficient, D_{10}^* (cm ² /s)	Diffusion path length, L_d (cm)	Convection path length, L_c (cm)	Source vapor conc., C_{sw} (µg/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D_{crack} (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent foundation pore number, n (unitless)	Infinite source vapor concentration coefficient, C_{sw} (µg/m ³)	Infinite source bldg. conc., C_{bldg} (µg/m ³)	Unit risk factor, URF (µg/m ³) ⁻¹	Reference conc., RNC (mg/m ³)
71596 1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.63E-04	47.78	15	1.93E+04	0.10	1.04E+01	4.75E-04	6.45E+02	9.58E+220	1.05E-05	2.05E+01	N/A	2.7E+00
76131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.70E-04	47.78	15	N/A	0.10	1.04E+01	1.75E-04	6.45E+02	#NUM!	7.05E-06	N/A	N/A	3.0E+01
79005 1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.13E-04	47.78	15	N/A	0.10	1.04E+01	5.24E-04	6.45E+02	1.44E+200	1.02E-05	N/A	1.5E-05	2.2E+00
75343 1,1-Dichloroethane	1.75E-04	4.50E-04	4.29E-04	4.46E-04	47.78	15	8.97E+03	0.10	1.04E+01	4.50E-04	6.45E+02	1.67E+220	1.05E-05	8.43E-02	N/A	5.0E-01
75354 1,1-Dichlorobutene	1.75E-04	5.47E-04	5.12E-04	5.33E-04	47.78	15	5.71E+03	0.10	1.04E+01	5.47E-04	6.45E+02	8.08E+191	1.05E-05	6.35E-02	N/A	2.0E-01
120821 1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.21E-04	47.78	15	N/A	0.10	1.04E+01	2.25E-04	6.45E+02	#NUM!	8.04E-06	N/A	N/A	2.0E-01
85011 1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.50E-02	1.58E-02	47.78	15	6.09E-02	0.10	1.04E+01	1.56E-02	6.45E+02	5.40E+095	1.45E-05	9.02E-07	N/A	N/A
541731 Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.49E-04	47.78	15	N/A	0.10	1.04E+01	2.56E-04	6.45E+02	#NUM!	6.49E-06	N/A	N/A	N/A
106487 1,4-Dichlorobenzene	1.75E-04	4.35E-04	4.12E-04	4.28E-04	47.78	15	N/A	0.10	1.04E+01	4.35E-04	6.45E+02	2.83E+230	1.04E-05	N/A	N/A	5.0E-01
78633 Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.38E-04	47.78	15	N/A	0.10	1.04E+01	9.45E-04	6.45E+02	1.09E+111	1.25E-05	N/A	N/A	N/A
67841 Acetone	1.75E-04	2.07E-03	2.06E-03	2.06E-03	47.78	15	2.06E+01	0.10	1.04E+01	2.07E-03	6.45E+02	5.63E+50	1.37E-05	2.83E-04	N/A	N/A
71432 Benzene	1.75E-04	5.42E-04	5.07E-04	5.28E-04	47.78	15	7.57E+02	0.10	1.04E+01	5.42E-04	6.45E+02	6.73E+193	1.10E-05	6.34E-03	7.8E-06	3.0E-02
74839 Bromomethane	1.75E-04	4.46E-04	4.16E-04	4.35E-04	47.78	15	2.35E+02	0.10	1.04E+01	4.46E-04	6.45E+02	1.91E+230	1.04E-05	2.47E-03	N/A	5.0E-03
75150 Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.18E-04	47.78	15	N/A	0.10	1.04E+01	6.34E-04	6.45E+02	2.87E+185	1.15E-05	N/A	N/A	7.0E-01
108007 Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.44E-04	47.78	15	6.65E+01	0.10	1.04E+01	4.55E-04	6.45E+02	3.97E+230	1.05E-05	6.97E-04	N/A	6.0E-02
75003 Ethyl Chloride	1.75E-04	7.95E-04	7.16E-04	7.45E-04	47.78	15	1.02E+04	0.10	1.04E+01	7.95E-04	6.45E+02	1.38E+137	1.18E-05	1.22E-01	N/A	1.0E+01
67863 Chloroform	1.75E-04	6.43E-04	6.02E-04	6.26E-04	47.78	15	N/A	0.10	1.04E+01	6.43E-04	6.45E+02	2.45E+163	1.15E-05	N/A	2.3E-05	5.0E-02
156582 cis-1,2-Dichloroethylene	1.75E-04	4.59E-04	4.30E-04	4.47E-04	47.78	15	6.52E+04	0.10	1.04E+01	4.59E-04	6.45E+02	7.49E+220	1.05E-05	8.85E-01	N/A	2.0E-01
110927 Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.72E-04	47.78	15	N/A	0.10	1.04E+01	4.85E-04	6.45E+02	3.37E+216	1.07E-05	N/A	#N/A	#N/A
100414 Ethylbenzene	1.75E-04	4.60E-04	4.31E-04	4.48E-04	47.78	15	1.04E+03	0.10	1.04E+01	4.60E-04	6.45E+02	1.44E+220	1.05E-05	N/A	1.0E+00	N/A
98828 Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.85E-04	47.78	15	N/A	0.10	1.04E+01	3.95E-04	6.45E+02	3.75E+205	1.00E-05	N/A	N/A	4.0E-01
108072 Methyl cyclohexane	1.75E-04	5.98E-04	5.69E-04	5.82E-04	47.78	15	1.11E+05	0.10	1.04E+01	5.98E-04	6.45E+02	4.68E+175	1.13E-05	1.25E+00	N/A	3.0E+00
163404 Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.28E-04	6.51E-04	47.78	15	N/A	0.10	1.04E+01	6.67E-04	6.45E+02	2.47E+157	1.16E-05	N/A	N/A	3.0E+00
75082 Methylene chloride	1.75E-04	6.35E-04	5.95E-04	6.19E-04	47.78	15	7.58E+02	0.10	1.04E+01	6.35E-04	6.45E+02	2.18E+165	1.15E-05	9.14E-03	4.7E-07	3.0E+00
127184 Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.27E-04	47.78	15	2.36E+03	0.10	1.04E+01	4.39E-04	6.45E+02	1.92E+230	1.04E-05	2.45E-02	5.9E-06	N/A
108883 Toluene	1.75E-04	5.34E-04	5.00E-04	5.20E-04	47.78	15	2.18E+03	0.10	1.04E+01	5.34E-04	6.45E+02	4.07E+196	1.10E-05	2.37E-02	N/A	4.0E-01
168605 trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.25E-04	47.78	15	4.55E+03	0.10	1.04E+01	4.32E-04	6.45E+02	1.43E+240	1.03E-05	4.69E-02	N/A	2.0E-01
75016 Trichloroethylene	1.75E-04	4.80E-04	4.52E-04	4.70E-04	47.78	15	6.83E+03	0.10	1.04E+01	4.80E-04	6.45E+02	2.03E+217	1.07E-05	7.78E-05	N/A	4.0E-02
75014 Vinyl chloride	1.75E-04	6.44E-04	6.07E-04	6.27E-04	47.78	15	1.38E+05	0.10	1.04E+01	6.44E-04	6.45E+02	1.02E+163	1.15E-05	1.59E+00	8.6E-06	1.0E-01
1330207 Xylenes	1.75E-04	3.76E-03	3.61E-03	3.77E-03	47.78	15	N/A	0.10	1.04E+01	3.76E-03	6.45E+02	1.01E+28	1.43E-05	N/A	N/A	1.0E-01
98052 Acetophenone	1.75E-04	2.80E-03	2.64E-03	2.62E-03	47.78	15	N/A	0.10	1.04E+01	2.80E-03	6.45E+02	2.48E+40	1.40E-05	N/A	N/A	N/A
91203 Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.60E-04	47.78	15	5.96E+01	0.10	1.04E+01	4.70E-04	6.45E+02	2.56E+223	1.06E-05	6.32E-04	N/A	3.0E-03
91576 Methyl-naphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.06E-04	47.78	15	2.34E+02	0.10	1.04E+01	3.13E-04	6.45E+02	#NUM!	9.23E-06	2.07E-03	N/A	3.0E-03
92524 Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.08E-04	47.78	15	N/A	0.10	1.04E+01	3.15E-04	6.45E+02	#NUM!	9.27E-06	N/A	N/A	N/A
208996 Acenaphthylene	1.75E-04	3.38E-04	3.22E-04	3.31E-04	47.78	15	N/A	0.10	1.04E+01	3.38E-04	6.45E+02	#NUM!	9.51E-06	N/A	N/A	3.0E-03
53529 Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.32E-04	47.78	15	N/A	0.10	1.04E+01	7.33E-04	6.45E+02	1.38E+143	1.19E-05	N/A	N/A	3.0E-03
68737 Fluorene	1.75E-04	8.16E-01	8.39E-01	8.25E-01	47.78	15	N/A	0.10	1.04E+01	8.16E-01	6.45E+02	1.34E+00	5.84E-05	N/A	N/A	3.0E-03
85018 Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.46E-04	47.78	15	2.81E+01	0.10	1.04E+01	3.50E-04	6.45E+02	2.10E+300	9.66E-06	2.72E-04	N/A	3.0E-03
120127 Anthracene	1.75E-04	1.60E-03	1.62E-03	1.61E-03	47.78	15	N/A	0.10	1.04E+01	1.60E-03	6.45E+02	6.30E+65	1.34E-05	N/A	N/A	3.0E-03
C9-C18 C9-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	3.39E+07	0.10	1.04E+01	3.64E-04	6.45E+02	4.88E+280	9.74E-06	3.30E+02	N/A	2.0E-01
C11-C22 C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.18E-04	47.78	15	6.49E+03	0.10	1.04E+01	4.27E-04	6.45E+02	7.52E+245	1.05E-05	6.88E-02	N/A	5.0E-02
C9-C9 C9-C9 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	3.22E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.81E+280	9.74E-06	3.14E+01	N/A	2.0E-01
C9-C10 C9-C10 Aromatics	1.75E-04	3.69E-04	3.45E-04	3.60E-04	47.78	15	1.22E+04	0.10	1.04E+01	3.69E-04	6.45E+02	1.62E+284	9.80E-06	1.20E-01	N/A	5.0E-02
C9-C12 C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	1.11E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.87E+280	9.74E-06	1.08E+01	N/A	2.0E-01

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	2.1E-06
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	4.2E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	7.0E-06
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	NA
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.2E-10	6.2E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	1.1E-05
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	2.6E-07
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	2.7E-07
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	7.6E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	2.4E-07
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	9.3E-06
634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	8.2E-12	6.8E-08
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	2.8E-10	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	1.3E-06
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	5.2E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	4.1E-05
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	2.7E-08	3.5E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	4.7E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	1.5E-05
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	2.0E-06
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	3.7E-02
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	3.0E-05
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	3.5E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	5.3E-05
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	1.2E-03

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	3E-08	4E-02

 = Cancer risk > 1E-05
or HQ/Hi > 1E+00

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Pipeline, Wells 05H Superfund Site, Operable Unit 2
Murphy Waste Oil

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES ☐ OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES ☒

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER 95% UCL groundwater conc., C _w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L _p (ft or 200 cm)	ENTER Depth below grade to water table, L _{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil groundwater temperature, T _s (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	ENTER User-defined vadose zone soil vapor permeability, K _v (cm ²)	OR	ENTER Vadose zone soil dry bulk density, ρ _b ^V (g/cm ³)	ENTER Vadose zone soil total porosity, n ^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w ^V (cm ³ /cm ³)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _c (yrs)	ENTER Averaging time for noncarcinogens, AT _{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/y)	ENTER Exposure time ET (hr/day)	ENTER Conversion factor CF (hr/day)
71558	1,1,1-Trichloroethane	6.27E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76731	Trichloro-1,2,2,2-tetrafluoroethane, 1,1,2		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79003	1,1,2-Trichloroethane		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76343	1,1-Dichloroethane	7.24E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75354	1,1-Dichloroethane	9.20E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75357	1,2,4-Trichlorobenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
95061	1,2,4-Trichlorobenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
541731	1,2-Dichlorobenzene	1.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
100467	Dichlorobenzene, 1,3		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
78033	1,4-Dichlorobenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67641	Butanone, 2- (MEK)		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
74432	Acetone	2.42E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
74236	Benzene	6.54E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76760	Bromobenzene	1.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106907	Carbon Disulfide		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75003	Chlorobenzene	1.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67603	Ethyl Chloride	3.05E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106902	Chloroform		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
110627	1,1,2,2-Tetrachloroethane	7.43E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
100414	Carbon tetrachloride		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
56826	Ethylbenzene	7.61E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106672	Isopropylbenzene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106404	Methyl cyclohexane	7.00E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75092	Methyl Tertiary-Butyl Ether		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
127184	Methoxybenzene	1.99E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106663	Tetrahydrofuran	7.05E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106665	Toluene	1.71E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76016	trans-1,2-Dichloroethene	1.26E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76014	Trichloroethene	3.31E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1333207	Vinyl chloride	1.89E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
68862	Xylene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91203	Acetophenone		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91676	Naphthalene	9.09E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
92824	Methylnaphthalene, 2-	5.86E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
208998	Biphenyl, 1,1'-		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
63326	Acenaphthylene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
66737	Acenaphthene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
85016	Fluorene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120121	Phenanthrene	9.74E+00	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C18	Anthracene		15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C18	CS-C18 Aliphatics	9.51E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C18	CS-C18 Aromatics	4.19E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C9	CS-C9 Aliphatics	1.15E+02	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C10	CS-C10 Aliphatics	7.19E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
CS-C12	CS-C12 Aliphatics	3.30E+01	15	62.78	LS	10	LS	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760

Note
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
 Johnson & Ettinger Model - Chemical Properties Screen
 Inhalation of Volatiles from Groundwater
 Future Child Recreational Scenario - CT
 Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
 Murphy Waste Oil

Chemical CAS No.	Chemical	Diffusivity in air, D _a (cm ² /s)	Diffusivity in water, D _w (cm ² /s)	Henry's law constant at reference temperature, H (atm-m ³ /mol)	Henry's law constant reference temperature, T _R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH _{v,b} (cal/mol)	Normal boiling point, T _b (°K)	Critical temperature, T _c (°K)	Organic carbon partition coefficient, K _{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
78131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.81E-03	25	6,895	330.55	523.00	3.16E+01	5.08E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.81E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.80E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.87E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.86E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.85	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	8.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79018	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	380.36	544.20	1.68E+02	1.10E+03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	8.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	8.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.89E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.86E+00	25	NA	NA	NA	8.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Property, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Cell

	Source- building separation, L_b (cm)	Vadose zone soil air-filled porosity, ϕ_a (cm ³ /cm ³)	Vadose zone effective soil fluid saturation, S_w (cm ³ /cm ³)	Vadose zone soil intrinsic permeability, k_i (cm ²)	Vadose zone soil relative air permeability, k_{ra} (cm ²)	Vadose zone soil effective vapor permeability, k_v (cm ²)	Thickness of capillary zone, L_c (cm)	Total porosity in capillary zone, ϕ_{ca} (cm ³ /cm ³)	Air-filled porosity in capillary zone, ϕ_{ca} (cm ³ /cm ³)	Water-filled porosity in capillary zone, ϕ_{cw} (cm ³ /cm ³)	Floor- wall seam parameter, K_{fws} (cm)	Bldg ventilation rate, Q_{vent} (cm ³ /s)	Area of enclosed space below grade, A_g (cm ²)	Crack- to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, ΔH_{19} (cal/mol)	Henry's Law constant at ave. groundwater temperature, H_{19} (atm-m ³ /mol)	Henry's Law constant at ve. groundwater temperature, H_{19} (unitless)	
71556	1,1,1-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.885	8.50E-03	3.06E+01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.438	4.55E-01	1.96E+01
75005	1,1,2-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	5.572	3.88E-04	1.67E-02
75343	1,1-Dichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.552	2.88E-03	1.24E-01
75354	1,1-Dichloroethene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6.282	1.47E-02	6.34E-01
126821	1,2,4-Trichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	13.230	4.35E-04	1.67E-02
95501	1,2-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.521	1.41E-06	8.09E-05
54173	Dichlorobenzene, 1,3-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.803	4.11E-03	1.77E-01
106467	1,4-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	11.243	8.89E-04	3.83E-02
76933	Butanone, 2- (MEK)	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.486	4.90E-05	2.11E-03
87641	Acetone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.559	1.97E-05	8.50E-04
71432	Benzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8.127	2.69E-03	1.16E-01
74539	Bromomethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.337	5.52E-03	2.38E-01
78150	Carbon Dioxide	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6.682	6.99E-03	3.01E-01
106903	Chlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9.803	1.54E-03	6.68E-02
75003	Ethyl Chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.201	7.73E-03	3.35E-01
67663	Chloroform	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.554	1.86E-03	8.02E-02
156592	cis-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.734	2.04E-03	8.77E-02
110827	Cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.486	1.75E+00	7.54E+01
104414	Ethylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	10.153	3.18E-03	1.37E-01
98828	Isopropylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.540	1.28E-02	5.51E-01
108872	Methyl cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.505	3.70E-01	1.59E+01
183404	Methyl-Tertiary-Butyl Ether	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.447	5.16E-04	2.22E-02
75092	Methylene chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7.034	1.17E-03	5.03E-02
127184	Tetrahydrothiophene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8.553	7.80E-03	3.37E-01
104083	Toluene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8.154	2.92E-03	1.26E-01
756935	trans-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.417	8.77E-03	3.50E-01
75018	Trichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8.357	4.78E-03	2.06E-01
75014	Vinyl chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	5.000	1.73E-02	7.46E-01
133207	Xylenes	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.542	5.89E-06	2.52E-04
88865	Acetophenone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.518	8.91E-06	3.83E-04
91203	Naphthalene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	12.913	1.52E-04	6.55E-03
91576	Methylnaphthalene, 2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.536	8.86E-04	3.81E-02
32524	Biphenyl, 1,1'	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.472	2.86E-04	1.14E-02
20566	Acenaphthylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.513	2.49E-04	1.05E-02
83329	Acenaphthene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16.123	3.67E-05	1.58E-03
96797	Fluorene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16.235	2.20E-06	8.48E-07
85018	Phenanthrene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1.479	1.14E-04	4.90E-03
120127	Anthracene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	18.353	1.28E-05	5.43E-04
C9-C18	C9-C18 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	8.28E-01	3.59E+01
C11-C22	C11-C22 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.62E-04	1.55E-02
C5-C8	C5-C8 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	4.46E-01	2.79E+01
C9-C10	C9-C10 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.96E-03	1.70E-01
C9-C12	C9-C12 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	7.80E-01	3.36E+01

Appendix C-4
Johnson & Eklund Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells OAH Superfund Site, Open
Murphy Waste Oil

	Vapor viscosity at ave. soil temperature, μ (p/cm-s)	Vadose zone effective diffusion coefficient, D^*_v (cm ² /s)	Capillary zone effective diffusion coefficient, D^*_c (cm ² /s)	Total overall effective diffusion coefficient, D^*_T (cm ² /s)	Diffusion path length, L_d (cm)	Convection path length, L_c (cm)	Source vapor conc., C_{sw} (ug/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D^*_{crack} (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent foundation Porel number, $n_p(Pu)$	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., C_{bldg} (ug/m ³)	Unit risk factor, URF (ug/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71555	1.1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.63E-04	47.78	1.93E+04	0.10	1.04E+01	6.75E-04	6.45E+02	9.58E+220	1.08E-05	2.05E-01	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.70E-04	47.78	N/A	0.10	1.04E+01	1.75E-04	6.45E+02	#N/A	7.08E-06	N/A	N/A	3.0E+01
75005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.13E-04	47.78	N/A	0.10	1.04E+01	5.24E-04	6.45E+02	1.44E+230	1.08E-05	N/A	1.5E-05	2.2E+00
75043	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.48E-04	47.78	8.87E+03	0.10	1.04E+01	4.58E-04	6.45E+02	1.57E+229	1.05E-05	N/A	5.0E-01	N/A
75254	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.33E-04	47.78	5.71E+03	0.10	1.04E+01	5.47E-04	6.45E+02	8.08E+191	1.10E-05	6.30E-02	N/A	2.0E-01
120621	1,2-Dichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.21E-04	47.78	N/A	0.10	1.04E+01	2.25E-04	6.45E+02	#N/A	8.04E-06	N/A	N/A	2.0E-01
541731	1,2-Dichlorobenzene, 1,3-	1.75E-04	1.56E-02	1.56E-02	1.56E-02	47.78	6.09E-02	0.10	1.04E+01	1.56E-02	6.45E+02	5.40E+06	1.48E-05	9.02E-07	N/A	N/A
106487	1,4-Dichlorobenzene	1.75E-04	2.40E-04	2.40E-04	2.40E-04	47.78	N/A	0.10	1.04E+01	2.40E-04	6.45E+02	#N/A	8.49E-06	N/A	N/A	N/A
78833	Butanone, 2- (MEK)	1.75E-04	4.35E-04	4.12E-04	4.28E-04	47.78	N/A	0.10	1.04E+01	4.35E-04	6.45E+02	2.63E+239	1.04E-05	N/A	N/A	8.0E-01
67841	Acetone	1.75E-04	9.45E-04	9.27E-04	9.38E-04	47.78	N/A	0.10	1.04E+01	9.45E-04	6.45E+02	1.09E+111	1.25E-05	N/A	N/A	N/A
71432	Benzene	1.75E-04	2.07E-03	2.06E-03	2.06E-03	47.78	2.08E+01	0.10	1.04E+01	2.07E-03	6.45E+02	6.63E+90	1.37E-05	2.83E-04	N/A	N/A
74539	Bromomethane	1.75E-04	5.42E-04	5.07E-04	5.28E-04	47.78	7.57E+02	0.10	1.04E+01	5.42E-04	6.45E+02	6.73E+193	1.10E-05	9.34E-03	7.0E-06	3.0E-02
72150	Carbon Dioxide	1.75E-04	4.46E-04	4.18E-04	4.35E-04	47.78	2.38E+02	0.10	1.04E+01	4.46E-04	6.45E+02	1.91E+235	1.04E-05	2.47E-03	N/A	8.0E-03
108907	Chlorobenzene	1.75E-04	6.34E-04	5.94E-04	6.18E-04	47.78	N/A	0.10	1.04E+01	6.34E-04	6.45E+02	2.87E+165	1.15E-05	N/A	N/A	7.0E-01
75003	Ethyl Chloride	1.75E-04	4.55E-04	4.27E-04	4.44E-04	47.78	6.65E+01	0.10	1.04E+01	4.55E-04	6.45E+02	3.97E+230	1.05E-05	6.97E-04	N/A	6.0E-02
67663	Chloroform	1.75E-04	7.68E-04	7.16E-04	7.45E-04	47.78	N/A	0.10	1.04E+01	7.68E-04	6.45E+02	1.38E+137	1.19E-05	1.22E-01	N/A	1.0E+01
156092	cis-1,2-Dichloroethylene	1.75E-04	6.43E-04	6.02E-04	6.26E-04	47.78	N/A	0.10	1.04E+01	6.43E-04	6.45E+02	2.45E+163	1.15E-05	N/A	2.3E-05	5.0E-02
110827	Cyclohexane	1.75E-04	4.59E-04	4.30E-04	4.47E-04	47.78	6.52E+04	0.10	1.04E+01	4.59E-04	6.45E+02	7.49E+228	1.05E-05	8.55E-01	N/A	2.0E-01
100414	Ethylbenzene	1.75E-04	4.83E-04	4.53E-04	4.72E-04	47.78	N/A	0.10	1.04E+01	4.83E-04	6.45E+02	3.37E+218	1.07E-05	N/A	N/A	N/A
68028	Isopropylbenzene	1.75E-04	4.60E-04	4.31E-04	4.46E-04	47.78	1.04E+03	0.10	1.04E+01	4.60E-04	6.45E+02	1.44E+228	1.05E-05	1.09E-02	N/A	1.0E+00
108872	Methyl cyclohexane	1.75E-04	3.95E-04	3.70E-04	3.85E-04	47.78	N/A	0.10	1.04E+01	3.95E-04	6.45E+02	3.75E+265	1.00E-05	N/A	N/A	4.0E-01
1534044	Methyl-Tertiary-Butyl Ether	1.75E-04	5.98E-04	5.59E-04	5.82E-04	47.78	1.11E+05	0.10	1.04E+01	5.98E-04	6.45E+02	4.68E+175	1.13E-05	1.26E+00	N/A	3.0E+00
75002	Methylene chloride	1.75E-04	6.83E-04	6.23E-04	6.51E-04	47.78	N/A	0.10	1.04E+01	6.83E-04	6.45E+02	2.47E+157	1.16E-05	N/A	N/A	3.0E+00
127184	Tetrachloroethylene	1.75E-04	6.87E-04	6.23E-04	6.51E-04	47.78	7.98E+02	0.10	1.04E+01	6.87E-04	6.45E+02	1.92E+238	1.04E-05	2.43E-02	8.9E-06	N/A
108883	Toluene	1.75E-04	4.39E-04	4.11E-04	4.27E-04	47.78	2.38E+03	0.10	1.04E+01	4.39E-04	6.45E+02	1.92E+238	1.04E-05	2.43E-02	N/A	4.0E-01
156005	trans-1,2-Dichloroethylene	1.75E-04	5.24E-04	5.00E-04	5.20E-04	47.78	2.16E+03	0.10	1.04E+01	5.24E-04	6.45E+02	4.07E+196	1.10E-05	N/A	N/A	2.0E-01
79018	Trichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.20E-04	47.78	4.55E+03	0.10	1.04E+01	4.32E-04	6.45E+02	1.43E+243	1.03E-05	4.66E-02	N/A	2.0E-01
75014	Vinyl chloride	1.75E-04	4.83E-04	4.52E-04	4.70E-04	47.78	5.83E+03	0.10	1.04E+01	4.83E-04	6.45E+02	2.03E+217	1.07E-05	7.28E-02	1.1E-04	4.0E-02
1330207	Xylenes	1.75E-04	8.44E-04	8.02E-04	8.27E-04	47.78	1.38E+05	0.10	1.04E+01	8.44E-04	6.45E+02	1.02E+163	1.15E-05	1.58E+00	8.5E-06	1.0E-01
80862	Acetophenone	1.75E-04	3.75E-03	3.81E-03	3.77E-03	47.78	N/A	0.10	1.04E+01	3.75E-03	6.45E+02	1.01E+26	1.43E-05	N/A	N/A	N/A
31203	Naphthalene	1.75E-04	2.60E-03	2.62E-03	2.62E-03	47.78	N/A	0.10	1.04E+01	2.60E-03	6.45E+02	2.48E+440	1.40E-05	N/A	N/A	N/A
31576	Methylnaphthalene, 2-	1.75E-04	4.70E-04	4.50E-04	4.62E-04	47.78	5.95E+01	0.10	1.04E+01	4.70E-04	6.45E+02	2.55E+223	1.08E-05	6.32E-04	N/A	3.0E-03
32524	Biphenyl, 1,1'-	1.75E-04	3.13E-04	2.95E-04	3.08E-04	47.78	2.24E+02	0.10	1.04E+01	3.13E-04	6.45E+02	#N/A	9.23E-06	2.07E-03	N/A	3.0E-03
20865	Acenaphthylene	1.75E-04	3.01E-04	3.09E-04	3.09E-04	47.78	N/A	0.10	1.04E+01	3.01E-04	6.45E+02	#N/A	9.27E-06	N/A	N/A	N/A
33329	Acenaphthylene	1.75E-04	3.22E-04	3.31E-04	3.31E-04	47.78	N/A	0.10	1.04E+01	3.22E-04	6.45E+02	#N/A	8.51E-06	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	3.30E-04	3.31E-04	3.31E-04	47.78	N/A	0.10	1.04E+01	3.30E-04	6.45E+02	1.36E+143	1.19E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	7.33E-04	7.33E-04	7.33E-04	47.78	N/A	0.10	1.04E+01	7.33E-04	6.45E+02	1.36E+143	1.19E-05	N/A	N/A	3.0E-03
120127	Anthracene	1.75E-04	8.16E-01	3.41E-04	3.41E-04	47.78	N/A	0.10	1.04E+01	8.16E-01	6.45E+02	1.36E+143	1.19E-05	N/A	N/A	3.0E-03
CB-C15	CB-C15 Aliphatics	1.75E-04	3.05E-04	3.05E-04	3.05E-04	47.78	2.81E+01	0.10	1.04E+01	3.05E-04	6.45E+02	2.10E+300	9.68E-06	2.72E-04	N/A	3.0E-03
C11-C22	C11-C22 Aromatics	1.75E-04	3.40E-04	3.40E-04	3.40E-04	47.78	N/A	0.10	1.04E+01	3.40E-04	6.45E+02	6.32E+65	1.34E-05	N/A	N/A	3.0E-03
CB-C15	CB-C15 Aliphatics	1.75E-04	4.27E-04	4.05E-04	4.16E-04	47.78	3.39E+07	0.10	1.04E+01	4.27E-04	6.45E+02	4.88E+260	9.74E-06	3.30E+02	N/A	2.0E-01
CB-C10	CB-C10 Aromatics	1.75E-04	3.40E-04	3.40E-04	3.40E-04	47.78	6.49E+03	0.10	1.04E+01	3.40E-04	6.45E+02	7.52E+245	1.03E-05	8.88E-02	N/A	2.0E-02
CB-C12	CB-C12 Aliphatics	1.75E-04	3.64E-04	3.48E-04	3.60E-04	47.78	3.22E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.81E+288	9.74E-06	3.14E+01	N/A	2.0E-01
CB-C12	CB-C12 Aliphatics	1.75E-04	3.64E-04	3.48E-04	3.60E-04	47.78	1.22E+04	0.10	1.04E+01	3.64E-04	6.45E+02	1.62E+284	9.80E-06	1.20E-01	N/A	5.0E-02
CB-C12	CB-C12 Aliphatics	1.75E-04	3.64E-04	3.48E-04	3.60E-04	47.78	1.11E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.87E+288	9.74E-06	1.08E+01	N/A	2.0E-01

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	6.9E-07
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	1.4E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	2.3E-06
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	NA
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.4E-11	2.1E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	3.7E-06
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	8.6E-08
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	9.0E-08
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	2.5E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	8.1E-08
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	3.1E-06
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	9.1E-13	2.3E-08
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	3.1E-11	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	4.4E-07
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	1.7E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	1.7E-09	1.4E-05
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	3.0E-09	1.2E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	1.6E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	5.1E-06
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	6.7E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	1.2E-02
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	9.9E-06
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.2E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	1.8E-05
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	4.0E-04

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-09	1E-02

☐ = Cancer risk > 1E-05
or HQ/HI > 1E+00

Johnson & Stinger Model - Data Entry Screen
 Inhalation of Volatiles from Groundwater
 Future Child Residential Scenario - RME
 Southwest Properties, Well GSH Superfund Site, Operable Unit 2
 Aberdeen Auto Parts

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
 (enter "X" in "YES" box and initial groundwater conc. below)

YES

X

ENTER Chemical CAS No. (numbers only, no dashes)	Enter initial conc. Chemical	ENTER 95% UCL groundwater conc., C _w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L _p (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T _a (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	ENTER User-defined vadose zone soil vapor permeability, k _v (cm ²)	OR	ENTER Vadose zone soil dry bulk density, ρ _b (g/cm ³)	ENTER Vadose zone soil total porosity, n _T (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm ³ /cm ³)	ENTER Tarek risk for carcinogens, TR (unitless)	ENTER Tarek hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _c (yrs)	ENTER Averaging time for noncarcinogens, AT _{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hr/day)	ENTER Conversion factor CF (hr·yr)
71544	1,1,1-Trichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78131	Trichloro-1,2,2-trichloroethane, 1,1,2		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78005	1,1,2-Trichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78343	1,1-Dichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78354	1,1-Dichloroethane	1.0E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120131	1,2-Dichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
92501	1,2,4-Trichlorobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
641731	Dichlorobenzene, 1,3-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106467	1,4-Dichlorobenzene	4.69E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78033	Benzene, 2- (MSR)		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67541	Acetone		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
71432	Benzene	2.81E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
74236	Bromobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
76160	Carbon Disulfide		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106607	Chlorobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
76003	Ethyl Chloride		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67585	Chloroform		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106622	2,2,2-Trichloroethane	2.82E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
110627	Cyclohexane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
100414	Ethylbenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
84426	Isopropylbenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108872	Methyl cyclohexane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
165444	Methyl Tert-butyl Ether	1.49E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78292	Methylene chloride		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
127184	Tetrachloroethane	4.19E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108843	Toluene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
159605	1,2-Dichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78019	Trichloroethane	2.59E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
15014	Vinyl chloride	2.17E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1300207	Xylene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98882	Acetophenone		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91203	Naphthalene	2.70E-00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
81976	Methylnaphthalene, 2-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
92524	Benzene, 1,1'-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
20666	Azobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
83326	Azobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
88737	Fluorene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
85018	Phenanthrene	2.10E-00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120127	Anthracene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
CS-C18	CS-C18 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C11-C22	C11-C22 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
CS-C8	CS-C8 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
CS-C10	CS-C10 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
CS-C12	CS-C12 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760

Note:
 1) Default soil parameters from Table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n_T), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical		Diffusivity in air, D _a (cm ² /s)	Diffusivity in water, D _w (cm ² /s)	Henry's law constant at reference temperature, H (atm-m ³ /mol)	Henry's law constant reference temperature, T _R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH _{v,b} (cal/mol)	Normal boiling point, T _B (°K)	Critical temperature, T _C (°K)	Organic carbon partition coefficient, K _{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., RIC (mg/m ³)
CAS No.	Chemical											
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.80E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
87641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	N/A	N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79018	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.66E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Edgar Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Pipeline, Wells G&H Superfund Site, Overbank Unit 2
Aberdeen Auto Plant

		Source- building separation, L_r (m)	Volatiles zone soil air-filled porosity, ϕ_v (cm ³ /cm ³)	Volatiles zone effective total fluid saturation, S_w (cm ³ /cm ³)	Volatiles zone soil intrinsic permeability, k_s (cm ²)	Volatiles zone soil relative air permeability, k_{ra} (cm ²)	Volatiles zone soil effective vapor permeability, k_v (cm ²)	Thickness of capillary zone, L_w (cm)	Total porosity in capillary zone, ϕ_{ca} (cm ³ /cm ³)	Air-filled porosity in capillary zone, ϕ_{ca} (cm ³ /cm ³)	Water-filled porosity in capillary zone, ϕ_{wa} (cm ³ /cm ³)	Flow- path separation, X_{flow} (cm)	Area of enclosed space below capillary zone, A_e (cm ²)	Crack- to-total flow ratio, n (unitless)	Crack depth below capillary zone, Z_{max} (cm)	Enthalpy of vaporization at avg. groundwater temperature, $\Delta H_{v, T_g}$ (cal/mol)	Henry's law constant at avg. groundwater temperature, H_{T_g} (mm ³ /mm ³)	Henry's law constant at vs. groundwater temperature, H_{T_g} (unitless)	Vapor viscosity at avg. well temperature, μ_{T_g} (g/cm-s)	
71555	1,1,1-Trichloroethane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.885	8.50E-03	3.66E-01	1.75E-04
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.436	4.55E-01	1.96E+01	1.75E-04
76209	1,1,2,2-Tetrachloroethane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.436	4.55E-01	1.96E+01	1.75E-04
76343	1,1-Dichloroethane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	9.572	3.38E-04	1.87E-02	1.75E-04
76354	1,1-Dichloroethane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.455	2.88E-02	0.24E-01	1.75E-04
120521	1,2,4-Trichlorobenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	6.382	1.41E-02	0.33E-01	1.75E-04
66501	1,2-Dichlorobenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	13.230	1.35E-04	1.87E-02	1.75E-04
641731	Orthodichlorobenzene, 1,2-	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.521	1.41E-06	6.09E-05	1.75E-04
106447	1,4-Dichlorobenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.903	4.11E-03	1.77E-01	1.75E-04
78633	Benzene, 2,3-Dichloro-	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	11.243	8.86E-04	3.83E-02	1.75E-04
87841	Acetone	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.498	4.85E-05	2.11E-03	1.75E-04
71432	Benzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.550	1.87E-05	9.50E-04	1.75E-04
74839	Bromobenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	8.122	2.68E-03	1.18E-01	1.75E-04
75180	Carbon Disulfide	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.237	5.52E-03	2.38E-01	1.75E-04
108907	Chlorobenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	6.682	0.89E-03	3.01E-01	1.75E-04
75003	Ethyl Chloride	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	9.803	1.84E-03	6.98E-02	1.75E-04
67863	Chloroform	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.201	7.79E-03	3.35E-01	1.75E-04
106582	cis-1,2-Dichloroethylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.654	1.86E-03	8.02E-02	1.75E-04
110627	Cyclohexane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.734	2.04E-03	6.77E-02	1.75E-04
100414	Ethylbenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.498	1.72E-03	7.64E-01	1.75E-04
96828	Isopropylbenzene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	10.155	3.18E-03	3.15E-01	1.75E-04
108872	Methyl cyclohexane	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.840	1.28E-02	5.51E-01	1.75E-04
1024044	Methyl-Tert-butyl Ether	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.505	3.70E-01	1.56E+01	1.75E-04
75092	Methylene chloride	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.447	5.16E-04	2.22E-02	1.75E-04
127194	Tetrachloroethylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	7.534	1.17E-03	3.03E-02	1.75E-04
108483	Toluene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	9.553	7.83E-03	3.17E-01	1.75E-04
106605	trans-1,2-Dichloroethylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	9.154	2.92E-03	1.28E-01	1.75E-04
72018	Trichloroethylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.417	8.27E-03	3.66E-01	1.75E-04
73014	Vinyl chloride	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	8.557	4.79E-03	2.06E-01	1.75E-04
1330207	Xylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	5.000	1.72E-02	7.48E-01	1.75E-04
95892	Acetophenone	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.542	5.85E-06	2.53E-04	1.75E-04
91203	Naphthalene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.518	6.91E-06	3.63E-04	1.75E-04
91615	Methyl-naphthalene, 2-	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	12.813	1.52E-04	6.65E-03	1.75E-04
62504	Styrene, 1,1-	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.506	8.86E-04	3.81E-02	1.75E-04
206808	Acenaphthylene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.472	2.98E-04	1.14E-02	1.75E-04
63329	Acenaphthene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.515	2.41E-04	1.05E-02	1.75E-04
86737	Fluorene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	15.123	3.87E-05	1.58E-03	1.75E-04
85018	Phenanthrene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	15.235	2.20E-06	8.48E-07	1.75E-04
126127	Anthracene	27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	1.479	1.14E-04	4.90E-03	1.75E-04
C5-C18 C5-C18 Aromatics		27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	18.282	1.28E-05	5.43E-04	1.75E-04
C11-C22 C11-C22 Aromatics		27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	NA	8.28E-01	3.96E-01	1.75E-04
C5-C8 C5-C8 Aromatics		27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	NA	3.60E-04	1.55E-02	1.75E-04
C9-C10 C9-C10 Aromatics		27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	NA	6.48E-01	3.79E-01	1.75E-04
C9-C12 C9-C12 Aromatics		27.6	0.130	0.859	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.87E+07	5.31E-05	15	NA	3.99E-03	1.70E-01	1.75E-04

Appendix C.4
Johnson & Ettrich Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

	Vadose zone effective diffusion coefficient, D_{eff}^v (cm ² /s)	Capillary zone effective diffusion coefficient, D_{eff}^c (cm ² /s)	Total overall effective diffusion coefficient, D_{eff}^T (cm ² /s)	Diffusion path length, L_d (cm)	Correction length, L_c (cm)	Source volat conc., C_{soil} (ug/m ³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg, Q_{avg} (cm ³ /s)	Crack effective diffusion coefficient, D_{eff}^c (cm ² /s)	Area of crack, A_{crack} (cm ²)	Exponent of equivalent pore number, n_p (unitless)	Infinite source attenuation coefficient, α (unitless)	Infinite source bldg conc., C_{bldg} (ug/m ³)	Unit fator, URF (ug/m ³)	Reference conc., RfC (mg/m ³)
71550 1,1,1-Trichloroethane	4.78E-04	4.45E-04	4.86E-04	87.8	15	N/A	0.10	4.78E+01	4.75E-04	3.01E+03	1.21E+218	2.35E-06	N/A	N/A	2.2E+00
78131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.63E-04	1.71E-04	87.8	15	N/A	0.10	4.78E+01	1.75E-04	3.01E+03	#N/A	1.88E-06	N/A	N/A	2.0E+01
79305 1,1,2-Trichloroethane	5.24E-04	4.99E-04	5.19E-04	87.8	15	N/A	0.10	4.78E+01	5.24E-04	3.01E+03	1.42E+197	2.35E-06	N/A	N/A	2.2E+00
75343 1,1,2-Dichloroethane	4.58E-04	4.26E-04	4.50E-04	87.8	15	N/A	0.10	4.78E+01	4.58E-04	3.01E+03	1.85E+226	2.35E-06	N/A	N/A	5.0E-01
75344 1,1-Dichloroethylene	5.47E-04	5.12E-04	5.37E-04	87.8	15	8.71E+01	0.10	4.78E+01	5.47E-04	3.01E+03	2.46E+169	2.35E-06	1.80E-04	N/A	2.0E-01
120821 1,2,4-Trichlorobenzene	2.25E-04	2.14E-04	2.22E-04	87.8	15	N/A	0.10	4.78E+01	2.25E-04	3.01E+03	#N/A	2.15E-06	N/A	N/A	2.0E-01
98501 1,2-Dichlorobenzene	1.96E-02	1.89E-02	1.97E-02	87.8	15	N/A	0.10	4.78E+01	1.96E-02	3.01E+03	4.41E+06	2.64E-06	N/A	N/A	N/A
841731 Dichlorobenzene, 1,3-	2.59E-04	2.49E-04	2.51E-04	87.8	15	N/A	0.10	4.78E+01	2.59E-04	3.01E+03	#N/A	2.18E-06	N/A	N/A	N/A
106481 1,4-Dichlorobenzene	4.38E-04	4.12E-04	4.31E-04	87.8	15	1.79E+01	0.10	4.78E+01	4.38E-04	3.01E+03	2.05E+236	2.34E-06	4.16E-05	N/A	8.0E-01
78533 Bromoethane, 2, (MBO)	9.45E-04	9.27E-04	9.40E-04	87.8	15	N/A	0.10	4.78E+01	9.45E-04	3.01E+03	3.81E+108	2.45E-06	N/A	N/A	N/A
87641 Acetone	2.97E-03	2.95E-03	2.97E-03	87.8	15	N/A	0.10	4.78E+01	2.97E-03	3.01E+03	1.22E+150	2.67E-06	N/A	N/A	N/A
71432 Benzene	6.42E-04	6.07E-04	6.32E-04	87.8	15	3.02E+01	0.10	4.78E+01	5.42E-04	3.01E+03	1.94E+191	2.36E-06	7.22E-05	7.9E-06	3.0E-03
74839 Bromomethane	4.48E-04	4.18E-04	4.38E-04	87.8	15	N/A	0.10	4.78E+01	4.48E-04	3.01E+03	1.58E+232	2.34E-06	N/A	N/A	6.0E-03
75150 Carbon Disulfide	6.34E-04	5.94E-04	6.23E-04	87.8	15	N/A	0.10	4.78E+01	6.34E-04	3.01E+03	1.95E+183	2.42E-06	N/A	N/A	7.0E-01
105907 Chlorobenzene	4.55E-04	4.27E-04	4.47E-04	87.8	15	N/A	0.10	4.78E+01	4.55E-04	3.01E+03	3.77E+227	2.35E-06	N/A	N/A	8.0E-02
75003 Ethyl Chloride	7.68E-04	7.18E-04	7.51E-04	87.8	15	N/A	0.10	4.78E+01	7.68E-04	3.01E+03	2.20E+135	2.49E-06	N/A	N/A	1.0E+01
87583 Chloroform	6.43E-04	6.02E-04	6.31E-04	87.8	15	N/A	0.10	4.78E+01	6.43E-04	3.01E+03	1.77E+191	2.47E-06	N/A	N/A	5.0E-02
155982 cis-1,2-Dichloroethylene	4.59E-04	4.30E-04	4.80E-04	87.8	15	2.54E+03	0.10	4.78E+01	4.59E-04	3.01E+03	7.48E+225	2.35E-06	5.97E-03	N/A	2.0E-01
110627 Cyclohexane	4.55E-04	4.53E-04	4.76E-04	87.8	15	N/A	0.10	4.78E+01	4.55E-04	3.01E+03	4.89E+213	2.39E-06	N/A	N/A	N/A
100414 Ethylbenzene	4.60E-04	4.31E-04	4.62E-04	87.8	15	N/A	0.10	4.78E+01	4.60E-04	3.01E+03	1.47E+225	2.35E-06	N/A	N/A	1.0E+00
98826 Isopropylbenzene	3.95E-04	3.70E-04	3.86E-04	87.8	15	N/A	0.10	4.78E+01	3.95E-04	3.01E+03	1.24E+262	2.31E-06	N/A	N/A	4.0E-01
108872 Methyl cyclohexane	5.96E-04	5.69E-04	5.99E-04	87.8	15	N/A	0.10	4.78E+01	5.96E-04	3.01E+03	2.33E+173	2.41E-06	N/A	N/A	3.0E+00
163404 Methyl Tertiary Butyl Ether	6.97E-04	6.28E-04	6.56E-04	87.8	15	3.11E+02	0.10	4.78E+01	6.97E-04	3.01E+03	2.13E+165	2.43E-06	7.94E-04	N/A	3.0E+00
75902 Methylene chloride	6.30E-04	5.90E-04	6.24E-04	87.8	15	N/A	0.10	4.78E+01	6.30E-04	3.01E+03	1.49E+183	2.42E-06	N/A	N/A	4.7E-07
127184 Tetrahydrofuran	4.36E-04	4.11E-04	4.31E-04	87.8	15	1.41E+02	0.10	4.78E+01	4.36E-04	3.01E+03	1.40E+236	2.34E-06	3.26E-04	5.9E-05	N/A
108083 Toluene	5.34E-04	5.00E-04	5.24E-04	87.8	15	N/A	0.10	4.78E+01	5.34E-04	3.01E+03	1.08E+184	2.39E-06	N/A	N/A	4.9E-01
159915 trans-1,2-Dichloroethylene	4.32E-04	4.04E-04	4.24E-04	87.8	15	N/A	0.10	4.78E+01	4.32E-04	3.01E+03	9.20E+226	2.33E-06	N/A	N/A	2.0E-01
73016 Trichloroethylene	4.85E-04	4.74E-04	4.74E-04	87.8	15	5.18E+03	0.10	4.78E+01	4.85E-04	3.01E+03	2.88E+214	2.36E-06	1.22E-02	1.1E-04	4.0E-02
75014 Vinyl chloride	6.44E-04	6.02E-04	6.37E-04	87.8	15	1.62E+02	0.10	4.78E+01	6.44E-04	3.01E+03	7.47E+180	2.43E-06	3.93E-04	5.8E-05	1.0E-01
1330207 Xylene	3.75E-03	3.81E-03	3.77E-03	87.8	15	N/A	0.10	4.78E+01	3.75E-03	3.01E+03	4.33E+207	2.61E-06	N/A	N/A	1.0E-01
68842 Acetophenone	2.90E-03	2.84E-03	2.87E-03	87.8	15	N/A	0.10	4.78E+01	2.90E-03	3.01E+03	7.23E+30	2.50E-06	N/A	N/A	N/A
91203 Naphthalene	4.70E-04	4.50E-04	4.64E-04	87.8	15	1.77E+01	0.10	4.78E+01	4.70E-04	3.01E+03	3.02E+220	2.39E-06	4.17E-05	N/A	3.0E-03
91576 Methylmethylolurea, 2-	3.13E-04	2.95E-04	3.08E-04	87.8	15	N/A	0.10	4.78E+01	3.13E-04	3.01E+03	#N/A	2.23E-06	N/A	N/A	3.0E-03
92834 Benzene, 1,1'	3.16E-04	3.03E-04	3.11E-04	87.8	15	N/A	0.10	4.78E+01	3.16E-04	3.01E+03	#N/A	2.24E-06	N/A	N/A	N/A
208589 Acetophenylene	3.38E-04	3.22E-04	3.33E-04	87.8	15	N/A	0.10	4.78E+01	3.38E-04	3.01E+03	7.70E+306	2.85E-06	N/A	N/A	3.0E-03
83329 Acetophenone	7.30E-04	7.31E-04	7.33E-04	87.8	15	N/A	0.10	4.78E+01	7.30E-04	3.01E+03	1.83E+141	2.45E-06	N/A	N/A	3.0E-03
86737 Fluorene	8.18E-01	8.28E-01	8.22E-01	87.8	15	N/A	0.10	4.78E+01	8.18E-01	3.01E+03	1.34E+00	1.04E-05	N/A	N/A	3.0E-03
88015 Phenanthrene	3.90E-04	3.41E-04	3.47E-04	87.8	15	1.33E+01	0.10	4.78E+01	3.90E-04	3.01E+03	2.47E+286	2.37E-06	2.34E-05	N/A	3.0E-03
120127 Anthracene	1.90E-03	1.82E-03	1.86E-03	87.8	15	N/A	0.10	4.78E+01	1.90E-03	3.01E+03	8.87E+04	2.55E-06	N/A	N/A	3.0E-03
C9-C18 C9-C18 Aromatics	3.64E-04	3.40E-04	3.57E-04	87.8	15	N/A	0.10	4.78E+01	3.64E-04	3.01E+03	8.02E+284	2.26E-06	N/A	N/A	2.0E-01
C11-C22 C11-C22 Aromatics	4.27E-04	4.05E-04	4.21E-04	87.8	15	N/A	0.10	4.78E+01	4.27E-04	3.01E+03	4.50E+282	2.33E-06	N/A	N/A	5.0E-02
C9-C18 C9-C18 Aromatics	3.54E-04	3.40E-04	3.57E-04	87.8	15	N/A	0.10	4.78E+01	3.54E-04	3.01E+03	7.51E+284	2.28E-06	N/A	N/A	2.0E-01
C9-C10 C9-C10 Aromatics	3.89E-04	3.48E-04	3.63E-04	87.8	15	N/A	0.10	4.78E+01	3.89E-04	3.01E+03	3.04E+280	2.29E-06	N/A	N/A	5.0E-02
C9-C12 C9-C12 Aromatics	2.64E-04	3.40E-04	3.37E-04	87.8	15	N/A	0.10	4.78E+01	3.64E-04	3.01E+03	7.99E+284	2.28E-06	N/A	N/A	2.0E-01

Appendix C.4

Johnson & Ettinger Model - Results

Inhalation of Volatiles from Groundwater

Future Child Recreational Scenario - RME

Southwest Properties, Wells G&H Superfund Site, Operable Unit 2

Berjona Auto Parts

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

	Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556 1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	N/A	NA	NA
76131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	N/A	NA	NA
79005 1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	N/A	NA	NA
75343 1,1-Dichloroethane	NA	NA	NA	5.08E+06	N/A	NA	NA
75354 1,1-Dichloroethylene	NA	NA	NA	2.25E+06	N/A	NA	1.8E-08
120821 1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	N/A	NA	NA
95501 1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	N/A	NA	NA
541731 Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	N/A	NA	NA
106467 1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	N/A	NA	1.2E-09
78933 Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	N/A	NA	NA
67841 Acetone	NA	NA	NA	1.00E+09	N/A	NA	NA
71432 Benzene	NA	NA	NA	1.75E+06	N/A	1.1E-12	5.4E-08
74839 Bromomethane	NA	NA	NA	1.52E+07	N/A	NA	NA
75150 Carbon Disulfide	NA	NA	NA	2.67E+06	N/A	NA	NA
108907 Chlorobenzene	NA	NA	NA	4.72E+05	N/A	NA	NA
75003 Ethyl Chloride	NA	NA	NA	5.32E+06	N/A	NA	NA
67683 Chloroform	NA	NA	NA	7.92E+08	N/A	NA	NA
156582 cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	N/A	NA	6.6E-07
110827 Cyclohexane	NA	NA	NA	5.50E+04	N/A	NA	NA
100414 Ethylbenzene	NA	NA	NA	1.69E+05	N/A	NA	NA
98828 Isopropylbenzene	NA	NA	NA	5.60E+04	N/A	NA	NA
108872 Methyl cyclohexane	NA	NA	NA	1.40E+04	N/A	NA	NA
183404 Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	N/A	NA	5.6E-09
75092 Methylene chloride	NA	NA	NA	1.30E+07	N/A	NA	NA
127184 Tetrachloroethylene	NA	NA	NA	2.00E+05	N/A	3.7E-12	NA
108883 Toluene	NA	NA	NA	5.26E+05	N/A	NA	NA
156605 trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	N/A	NA	NA
79016 Trichloroethylene	NA	NA	NA	1.10E+06	N/A	2.6E-09	6.8E-06
75014 Vinyl chloride	NA	NA	NA	2.76E+06	N/A	6.6E-12	8.8E-08
1330207 Xylenes	NA	NA	NA	2.20E+05	N/A	NA	NA
98862 Acetophenone	NA	NA	NA	6.13E+06	N/A	NA	NA
91203 Naphthalene	NA	NA	NA	3.10E+04	N/A	NA	3.1E-07
91576 Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	N/A	NA	NA
92524 Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	N/A	NA	NA
208968 Acenaphthylene	NA	NA	NA	3.93E+03	N/A	NA	NA
83329 Acenaphthene	NA	NA	NA	4.24E+03	N/A	NA	NA
86737 Fluorene	NA	NA	NA	1.90E+03	N/A	NA	NA
85018 Phenanthrene	NA	NA	NA	1.28E+03	N/A	NA	1.7E-07
120127 Anthracene	NA	NA	NA	4.34E+01	N/A	NA	NA
C9-C18 C9-C18 Aliphatics	NA	NA	NA	1.00E+04	N/A	NA	NA
C11-C22 C11-C22 Aromatics	NA	NA	NA	5.80E+06	N/A	NA	NA
C5-C8 C5-C8 Aliphatics	NA	NA	NA	1.10E+07	N/A	NA	NA
C9-C10 C9-C10 Aromatics	NA	NA	NA	5.10E+07	N/A	NA	NA
C9-C12 C9-C12 Aliphatics	NA	NA	NA	7.00E+04	N/A	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	3E-09	8E-06

☐ = Cancer risk > 1E-05
 or HQ/HI > 1E+00

END

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES ☐ OR ☐

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES ☐ X ☒

ENTER Chemical CAS No. (number only, no dashes)	ENTER Initial conc. C _W (µg/L)	ENTER 95% UCL groundwater conc., C _W (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L _w (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SOC soil type directly above water table	ENTER Average soil groundwater temperature, T _s (°C)	ENTER Vadose zone SOC soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone soil dry bulk density, ρ _b (g/cm ³)	ENTER Vadose zone soil total porosity, n _t (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm ³ /cm ³)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _c (yrs)	ENTER Averaging time for noncarcinogens, AT _{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hr/day)	ENTER Conversion factor CF (hr/day)
71666	1,1,1-Trichloroethane		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76005	1,1,2-Trichloroethane		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76343	1,1-Dichloroethane		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
71354	1,1-Dichloroethene	1.05E-01	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
120871	1,2,4-Trichlorobenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91551	1,2,4-Trichlorobenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
841731	1,4-Dichlorobenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
106467	Dichlorobenzene, 1,2		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76633	1,4-Dichlorobenzene	4.66E-01	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76633	Benzene, 2-METHYL		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
61541	Acetone		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
74332	Benzene	2.61E-01	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
74339	Bromobenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76150	Carbon Disulfide		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
108607	Chlorobenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76003	Ethyl Chloride		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91683	Chloroform		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
106502	cis-1,2-Dichloroethene	6.79E+00	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
110827	Cyclohexane		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
100414	Ethylbenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
88528	Isopropylbenzene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
108572	Methyl cyclohexane		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
163444	Methyl Isobutyl Ether	4.21E+00	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
76092	Methyl chloride		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
127184	Tetrachloroethylene	4.18E-01	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
108933	Toluene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
158953	trans-1,2-Dichloroethylene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
75018	Trichloroethylene	7.51E+00	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
75014	Vinyl chloride	2.17E-01	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
1330207	Xylenes		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
66880	Acetophenone		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91578	Naphthalene	1.32E+00	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91578	Methylnaphthalene, 2		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91578	Benzene, 1,1,1		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
91578	Acetophenone		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
83326	Acetophenone		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
86757	Fluorene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
85018	Phenanthrene	2.10E+00	15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
120121	Anthracene		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
CS-C16	CS-C16 Aliphatics		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
C11-C22	C11-C22 Aromatics		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
CS-C8	CS-C8 Aliphatics		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
CS-C10	CS-C10 Aromatics		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760
CS-C12	CS-C12 Aliphatics		15	82.0	L8	10	L8	1	1.5	0.43	0.3	1.0E-06	1	70	2	2	2	2	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n_t), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical	Diffusivity in air, D _a (cm ² /s)	Diffusivity in water, D _w (cm ² /s)	Henry's law constant at reference temperature, H (atm-m ³ /mol)	Henry's law constant reference temperature, T _R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH _{v,b} (cal/mol)	Normal boiling point, T _B (°K)	Critical temperature, T _C (°K)	Organic carbon partition coefficient, K _{oc} (cm ³ /g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., R/C (mg/m ³)
CAS No. Chemical											
71556 1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131 Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005 1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343 1,1-Dichloroethane	7.42E-02	1.05E-05	5.81E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354 1,1-Dichloroethylene	9.00E-02	1.04E-05	2.81E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821 1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501 1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731 Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467 1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933 Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641 Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432 Benzene	8.80E-02	9.60E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839 Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150 Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907 Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003 Ethyl Chloride	1.26E-01	6.50E-06	8.87E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663 Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592 cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827 Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414 Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.89E+02	N/A	1.0E+00
98828 Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872 Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044 Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	8.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75082 Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184 Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883 Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605 trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016 Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.1E-04	4.0E-02
75014 Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207 Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862 Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203 Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576 Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524 Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968 Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329 Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737 Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018 Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127 Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18 C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22 C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8 C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10 C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12 C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberstone Auto Parts

	Source building location, L ₁ (cm)	Vadose zone soil air-filled porosity, θ _a ⁰ (cm ³ /cm ³)	Vadose zone effective soil saturation, S _e (cm ³ /cm ³)	Vadose zone intrinsic permeability, k _i (cm ²)	Vadose zone soil relative permeability, k _{rs} (cm ²)	Vadose zone soil effective vapor permeability, θ _{vs} (cm ²)	Thickness of capillary zone, L _c (cm)	Total porosity in capillary zone, n _{tc} (cm ³ /cm ³)	Air-filled porosity in capillary zone, θ _{as} (cm ³ /cm ³)	Water-filled porosity in capillary zone, θ _{ws} (cm ³ /cm ³)	Floor-wall seam perimeter, X _{crack} (cm)	Biog. ventilation rate, Q _{vent} (cm ³ /s)	Area of enclosed space below grade, A _g (cm ²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z _{crack} (cm)	Enthalpy of vaporization at average groundwater temperature, ΔH _v (cal/mol)	Henry's Law constant at average groundwater temperature, H _{iw} (atm-cm ³ /mol)	Henry's Law constant at average groundwater temperature, H _{is} (unitless)	
71556	1,1,1-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7.885	8.50E-03	3.65E-01
76131	Trichloro-1,2,2-Trifluoroethane, 1,1,2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.436	4.55E-01	1.56E+01
79009	1,1,2-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9.572	3.88E-04	1.67E-02
79343	1,1-Dichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7.450	2.85E-03	1.24E-01
73354	1,4-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	5.292	1.47E-02	6.34E-01
120821	1,2,4-Trichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	13.230	4.35E-04	1.87E-02
95501	2,2-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.521	1.41E-06	6.09E-05
541731	Dichlorobenzene, 1,3-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.503	4.11E-03	1.77E-01
108467	1,4-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	11.243	8.63E-04	3.83E-02
78933	Butane, 2- (MEK)	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.486	4.90E-05	2.11E-03
81564	Acetone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.359	1.97E-05	8.00E-04
71432	Acetone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8.122	6.61E-03	2.81E-01
74838	Bromobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.337	5.52E-03	2.38E-01
75150	Carbon Disulfide	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6.882	6.89E-03	3.01E-01
104907	Chlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9.803	1.54E-03	6.65E-02
75003	Ethyl Chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.201	7.79E-03	3.35E-01
67693	Chloroform	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7.554	1.86E-03	6.02E-02
165992	1,2-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.446	1.75E+00	7.54E+01
110627	Cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	10.155	3.18E-03	1.37E-01
100414	Ethylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.540	1.26E-02	5.51E-01
96826	Isopropylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.595	3.70E-01	1.59E+01
104672	Methyl cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.447	5.16E-04	2.22E-02
1634044	Methyl Tertiary-Butyl Ether	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7.034	1.17E-03	5.03E-02
75097	Methylene chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9.583	7.78E-03	3.37E-01
127184	Tetrachloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.934	2.94E-03	1.26E-01
108843	Toluene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.417	8.27E-03	3.56E-01
156505	1,2,3-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8.157	4.75E-03	2.04E-01
79018	Trichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	5.000	1.73E-02	7.46E-01
75014	Vinyl chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.542	5.86E-06	2.52E-04
1330207	Xylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.518	8.81E-06	3.83E-04
96992	Acetophenone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.213	1.52E-04	5.55E-03
91023	Naphthalene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.356	8.86E-04	3.81E-02
91674	Methyl-naphthalene, 2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.472	2.66E-04	1.05E-02
35252	Styrene, 1,1-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.513	2.45E-04	1.05E-02
208998	Acumaphenylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16.123	3.07E-05	1.58E-03
83329	Acumaphenylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16.235	2.20E-08	9.43E-07
86737	Fluorene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1.479	1.14E-04	4.90E-03
85018	Phenanthrene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	10.383	1.26E-05	5.43E-04
120127	Anthracene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	8.28E-01	3.56E+01
CS-C16	CS-C16 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.25E-04	1.55E-02
C1-C12	C1-C12 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	6.28E-01	2.78E+01
CS-C8	CS-C8 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.96E-03	1.70E-01
CS-C10	CS-C10 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	7.00E-01	3.36E+01
C9-C12	C9-C12 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.96E-03	1.70E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Open
Aberlone Auto Parts

	Vapor viscosity at ave. soil temperature, μPa·s	Vadose zone effective diffusion coefficient, D _v ^{eff} (cm ² /s)	Capillary zone effective diffusion coefficient, D _w ^{eff} (cm ² /s)	Total overall effective diffusion coefficient, D _o ^{eff} (cm ² /s)	Diffusion path length, L _d (cm)	Convection path length, L _c (cm)	Source vapor conc., C _{sw} (μg/m ³)	Crack radius, r _{crack} (cm)	Average vapor flow rate into bldg., Q _{avg} (cm ³ /s)	Crack effective diffusion coefficient, D _{crack} ^{eff} (cm ² /s)	Area of crack, A _{crack} (cm ²)	Exponent of equivalent foundation pore number, exp(Pe) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., C _{bldg} (μg/m ³)	Unit risk factor, URF (μg/m ³) ⁻¹	Reference conc., RfC (mg/m ³)
71556 1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.66E-04	67.6	15	N/A	0.10	4.75E+01	4.75E-04	3.01E+03	1.21E+215	2.36E-06	N/A	N/A	2.2E+00
75131 1,1,2-Trichloroethane	1.75E-04	1.75E-04	1.63E-04	1.71E-04	67.6	15	N/A	0.10	4.75E+01	1.75E-04	3.01E+03	1.84E+06	1.84E-06	N/A	N/A	3.0E+01
75005 1,2-Dichloroethane	1.75E-04	5.24E-04	4.93E-04	5.15E-04	67.6	15	N/A	0.10	4.75E+01	5.24E-04	3.01E+03	3.42E+187	2.36E-06	N/A	1.6E-05	2.2E+00
75043 1,1-Dichloroethene	1.75E-04	4.55E-04	4.25E-04	4.50E-04	67.6	15	N/A	0.10	4.75E+01	4.55E-04	3.01E+03	1.65E+225	2.35E-06	N/A	N/A	5.0E-01
75354 1,1-Dichloroethane	1.75E-04	4.75E-04	4.45E-04	4.60E-04	67.6	15	8.71E+01	0.10	4.75E+01	5.47E-04	3.01E+03	2.46E+189	2.35E-06	1.80E-04	N/A	2.0E-01
120821 1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.22E-04	67.6	15	N/A	0.10	4.75E+01	2.25E-04	3.01E+03	1.84E+06	2.35E-06	N/A	N/A	2.0E-01
95001 1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.80E-02	1.57E-02	67.6	15	N/A	0.10	4.75E+01	1.56E-02	3.01E+03	4.41E+06	2.35E-06	N/A	N/A	N/A
541731 Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.51E-04	67.6	15	N/A	0.10	4.75E+01	2.56E-04	3.01E+03	1.84E+06	2.35E-06	N/A	N/A	N/A
108467 1,4-Dichlorobenzene	1.75E-04	4.35E-04	4.12E-04	4.31E-04	67.6	15	1.79E+01	0.10	4.75E+01	4.35E-04	3.01E+03	2.05E+236	2.35E-06	4.19E-05	N/A	8.0E-01
78033 Butanediol, 2- (MEX)	1.75E-04	9.45E-04	9.27E-04	9.40E-04	67.6	15	N/A	0.10	4.75E+01	9.45E-04	3.01E+03	3.81E+108	2.49E-06	N/A	N/A	N/A
67641 Acetone	1.75E-04	2.07E-03	2.06E-03	2.07E-03	67.6	15	N/A	0.10	4.75E+01	2.07E-03	3.01E+03	1.22E+50	2.57E-06	N/A	N/A	N/A
71432 Benzene	1.75E-04	5.43E-04	5.07E-04	5.32E-04	67.6	15	3.02E+01	0.10	4.75E+01	5.43E-04	3.01E+03	1.94E+191	2.35E-06	7.22E-05	7.8E-06	3.0E-02
74839 Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.33E-04	67.6	15	N/A	0.10	4.75E+01	4.46E-04	3.01E+03	1.95E+232	2.34E-06	N/A	N/A	5.0E-03
75150 Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.23E-04	67.6	15	N/A	0.10	4.75E+01	6.34E-04	3.01E+03	1.95E+183	2.42E-06	N/A	N/A	7.0E-01
108907 Chlorobenzene	1.75E-04	4.56E-04	4.27E-04	4.47E-04	67.6	15	N/A	0.10	4.75E+01	4.56E-04	3.01E+03	3.77E+227	2.35E-06	N/A	N/A	6.0E-02
75003 Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.51E-04	67.6	15	N/A	0.10	4.75E+01	7.66E-04	3.01E+03	2.20E+135	2.45E-06	N/A	N/A	1.0E+01
67663 Chloroform	1.75E-04	6.43E-04	6.02E-04	6.31E-04	67.6	15	N/A	0.10	4.75E+01	6.43E-04	3.01E+03	1.77E+161	2.43E-06	N/A	N/A	5.0E-02
156992 cis-1,2-Dichloroethylene	1.75E-04	4.65E-04	4.36E-04	4.50E-04	67.6	15	5.93E+02	0.10	4.75E+01	4.65E-04	3.01E+03	7.48E+225	2.35E-06	1.40E-03	N/A	2.0E-01
110827 Cyclohexane	1.75E-04	4.65E-04	4.36E-04	4.50E-04	67.6	15	N/A	0.10	4.75E+01	4.65E-04	3.01E+03	4.89E+213	2.35E-06	N/A	N/A	N/A
100414 Ethylbenzene	1.75E-04	4.65E-04	4.36E-04	4.50E-04	67.6	15	N/A	0.10	4.75E+01	4.65E-04	3.01E+03	1.47E+225	2.35E-06	N/A	N/A	1.0E+00
96826 Isopropylbenzene	1.75E-04	3.89E-04	3.70E-04	3.85E-04	67.6	15	N/A	0.10	4.75E+01	3.89E-04	3.01E+03	1.24E+262	2.31E-06	N/A	N/A	4.0E-01
109872 Methyl cyclohexane	1.75E-04	5.66E-04	5.56E-04	5.66E-04	67.6	15	N/A	0.10	4.75E+01	5.66E-04	3.01E+03	2.33E+173	2.41E-06	N/A	N/A	3.0E+00
163404 Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.28E-04	6.56E-04	67.6	15	9.35E+01	0.10	4.75E+01	6.67E-04	3.01E+03	2.13E+155	2.43E-06	2.28E-04	N/A	3.0E+00
75092 Methylene chloride	1.75E-04	6.35E-04	6.24E-04	6.29E-04	67.6	15	N/A	0.10	4.75E+01	6.35E-04	3.01E+03	1.48E+183	2.42E-06	N/A	N/A	4.7E-07
127154 1,1,2,2-Tetrachloroethane	1.75E-04	4.39E-04	4.11E-04	4.25E-04	67.6	15	1.41E+02	0.10	4.75E+01	4.39E-04	3.01E+03	1.40E+236	2.34E-06	3.29E-04	5.3E-06	N/A
108883 Toluene	1.75E-04	5.34E-04	5.00E-04	5.26E-04	67.6	15	N/A	0.10	4.75E+01	5.34E-04	3.01E+03	1.08E+184	2.39E-06	N/A	N/A	4.0E-01
156605 Isane-1,2-Dichloroethylene	1.75E-04	4.33E-04	4.04E-04	4.24E-04	67.6	15	N/A	0.10	4.75E+01	4.33E-04	3.01E+03	9.95E+226	2.34E-06	N/A	N/A	2.0E-01
79016 Trichloroethylene	1.75E-04	4.83E-04	4.53E-04	4.74E-04	67.6	15	1.55E+03	0.10	4.75E+01	4.83E-04	3.01E+03	2.98E+214	2.34E-06	3.98E-03	1.1E-04	4.0E-02
75014 Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.32E-04	67.6	15	1.82E+02	0.10	4.75E+01	6.44E-04	3.01E+03	7.47E+160	2.43E-06	3.93E-04	8.8E-06	1.0E-01
1330207 Xylenes	1.75E-04	3.75E-03	3.61E-03	3.77E-03	67.6	15	N/A	0.10	4.75E+01	3.75E-03	3.01E+03	4.33E+27	2.61E-06	N/A	N/A	1.0E-01
98862 Acetophenone	1.75E-04	2.60E-03	2.61E-03	2.61E-03	67.6	15	N/A	0.10	4.75E+01	2.60E-03	3.01E+03	7.28E+39	2.59E-06	N/A	N/A	N/A
91203 Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.64E-04	67.6	15	8.64E+00	0.10	4.75E+01	4.70E-04	3.01E+03	3.02E+220	2.36E-06	2.04E-05	N/A	3.0E-03
91576 Methylmethylthylene, 2-	1.75E-04	3.13E-04	2.93E-04	3.08E-04	67.6	15	N/A	0.10	4.75E+01	3.13E-04	3.01E+03	1.84E+184	2.39E-06	N/A	N/A	3.0E-03
92524 Biphenyl, 1,1'	1.75E-04	3.15E-04	3.01E-04	3.11E-04	67.6	15	N/A	0.10	4.75E+01	3.15E-04	3.01E+03	1.84E+184	2.39E-06	N/A	N/A	N/A
208968 Acenaphthylene	1.75E-04	3.38E-04	3.22E-04	3.30E-04	67.6	15	N/A	0.10	4.75E+01	3.38E-04	3.01E+03	7.70E+306	2.39E-06	N/A	N/A	3.0E-03
63329 Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.33E-04	67.6	15	N/A	0.10	4.75E+01	7.33E-04	3.01E+03	1.63E+141	2.45E-06	N/A	N/A	3.0E-03
66737 Fluorene	1.75E-04	8.16E-01	8.36E-01	8.22E-01	67.6	15	N/A	0.10	4.75E+01	8.16E-01	3.01E+03	1.34E+00	1.04E-05	N/A	N/A	3.0E-03
65016 Phenanthrene	1.75E-04	3.55E-04	3.41E-04	3.47E-04	67.6	15	1.03E+01	0.10	4.75E+01	3.55E-04	3.01E+03	2.42E+286	2.27E-06	2.34E-05	N/A	3.0E-03
120127 Anthracene	1.75E-04	1.63E-03	1.62E-03	1.63E-03	67.6	15	N/A	0.10	4.75E+01	1.63E-03	3.01E+03	8.67E+64	2.35E-06	N/A	N/A	3.0E-03
CS-C18 CS-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.75E+01	3.64E-04	3.01E+03	8.92E+284	2.29E-06	N/A	N/A	2.0E-01
C11-C22 C11-C22 Aromatics	1.75E-04	4.27E-04	4.03E-04	4.21E-04	67.6	15	N/A	0.10	4.75E+01	4.27E-04	3.01E+03	4.50E+242	2.33E-06	N/A	N/A	3.0E-02
CS-C8 CS-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.75E+01	3.64E-04	3.01E+03	7.91E+284	2.29E-06	N/A	N/A	2.0E-01
CS-C10 CS-C10 Aromatics	1.75E-04	3.66E-04	3.46E-04	3.56E-04	67.6	15	N/A	0.10	4.75E+01	3.66E-04	3.01E+03	3.04E+280	2.29E-06	N/A	N/A	5.0E-02
CS-C12 CS-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.75E+01	3.64E-04	3.01E+03	7.89E+284	2.29E-06	N/A	N/A	2.0E-01

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

	Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556 1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	NA
75131 Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005 1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343 1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	NA
75354 1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	6.0E-09
120821 1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501 1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731 Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467 1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	3.9E-10
78933 Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641 Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432 Benzene	NA	NA	NA	1.75E+06	NA	1.2E-13	1.8E-08
74839 Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150 Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907 Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	NA
75003 Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663 Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592 cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	5.2E-08
110827 Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414 Ethylbenzene	NA	NA	NA	1.68E+05	NA	NA	NA
98828 Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872 Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044 Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	5.6E-10
75092 Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184 Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	4.1E-13	NA
108883 Toluene	NA	NA	NA	5.26E+05	NA	NA	NA
156605 trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	NA
79016 Trichloroethylene	NA	NA	NA	1.10E+06	NA	8.5E-11	6.8E-07
75014 Vinyl chloride	NA	NA	NA	2.76E+06	NA	7.3E-13	2.9E-08
1330207 Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862 Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203 Naphthalene	NA	NA	NA	3.10E+04	NA	NA	5.0E-08
91576 Methyl-naphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524 Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968 Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329 Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737 Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018 Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	5.8E-08
120127 Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18 C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	NA
C11-C22 C11-C22 Aromatics	NA	NA	NA	6.80E+06	NA	NA	NA
C5-C8 C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	NA
C9-C10 C9-C10 Aromatics	NA	NA	NA	6.10E+07	NA	NA	NA
C9-C12 C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	NA
TOTAL:						95% UCL Cancer Risk 9E-11	95% UCL HI 9E-07

☐ = Cancer risk > 1E-05
or HQ/HI > 1E+00

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES ☐ OR ☐

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES ☐ X ☒

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Chemical CAS No. (numbers only, no dashes)	Enter Initial group Chemical	ENTER 95% UCL groundwater conc., C _{gw} (µg/L)	Depth below grade to bottom of enclosed space floor, L _b (15 or 200 cm)	Depth below grade to water table, LWT (cm)	SCS soil type directly above water table	Average soil/ groundwater temperature, T _a (°C)	Vadose zone SCS (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)	Vadose zone soil dry bulk density, ρ _b ¹ (g/cm ³)	Vadose zone and total porosity, n ¹ (unitless)	Vadose zone and water-filled porosity, n _w ¹ (cm ³ /cm ³)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _c (yrs)	Averaging time for noncarcinogens, AT _{nc} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure time ET (hr/day)	Conversion factor CF (hr·kg)
71596	1,1,1-Trichloroethane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
78131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
75003	1,1,2-Trichloroethane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
75343	1,1-Dichloroethane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
75354	1,1-Dichloroethene	1.84E-01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
120421	1,2,4-Trichlorobenzene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
95501	1,2-Dichlorobenzene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
961751	Dichlorobenzene, 1,2-		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
105487	1,4-Dichlorobenzene	4.84E-01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
75633	Benzene, 2- (M20)		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
67641	Axetene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
71432	Benzene	1.00E-01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
74639	Bromomethane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
76150	Carbon Disulfide		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
105607	Chlorobenzene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
75003	Ethyl Chloride		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
67683	Chloroform		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
155562	cis-1,2-Dichlorobutene	8.25E+00	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
110627	Cyclohexane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
100414	Stilbenzene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
96826	Isopropylbenzene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
106675	Methyl cyclohexane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
1604044	Methyl-Tert-butyl Ether		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
76092	Methylcyclohexane		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
100683	Tetrachloroethylene	4.12E-01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
127184	Toluene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
155505	trans-1,2-Dichloroethylene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
79015	Trichloroethylene	2.50E+01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
76014	Vinyl chloride	2.40E-01	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
1303007	Xylene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
65862	Acetophenone		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
91203	Naphthalene	2.79E+00	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
91575	Methylnaphthalene, 2-		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
92524	Bisphenol A		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
305668	Acenaphthylene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
73339	Phenanthrene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
56737	Fluorene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
86015	Phenanthrene	2.10E+00	52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
120127	Anthracene		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aliphatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aromatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aliphatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aromatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aliphatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	
CF-C18	CF-C18 Aromatics		52.12	52.6	L5	10	L5	1	1.5	0.43	0.3	1.0E-06	1	70	24	24	350	15	8760	

Notes:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (n_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).